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U. S. DEPARTMENT OF AGRICULTURE.

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LIST OF WORKERS IN  
SUBJECTS PERTAINING TO AGRICULTURE,  
HOME ECONOMICS, AND MARKETING.

PART 1. United States Department of Agriculture.

Prepared in the Division of Publications,  
EDWY B. REID, Chief.

PART 2. State Agricultural Colleges and Experi-  
ment Stations.

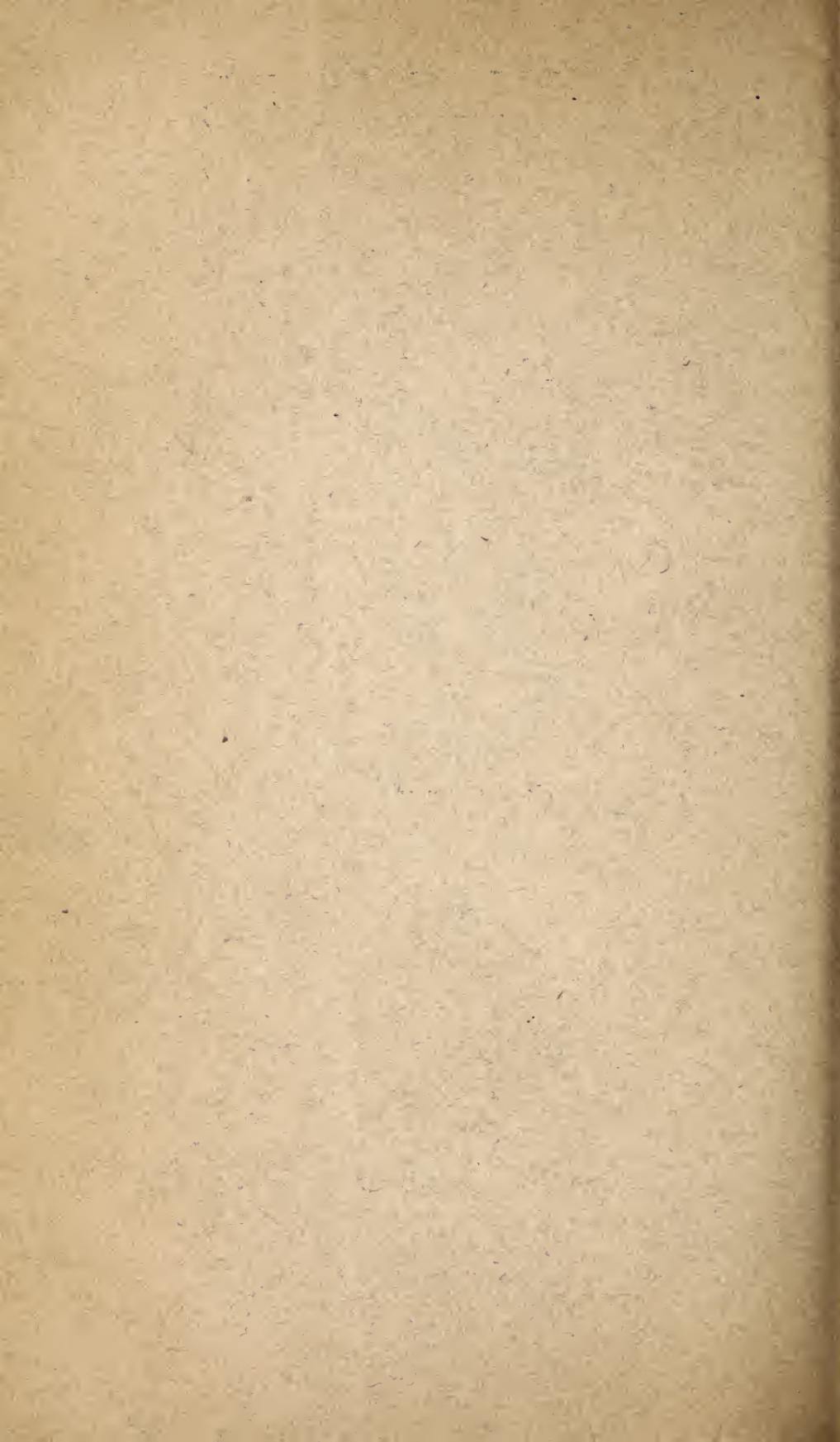
Prepared in the States Relations Service,  
A. C. TRUE, Director.

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1918-1919.



WASHINGTON:  
GOVERNMENT PRINTING OFFICE.  
1919.



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PART 1.

UNITED STATES DEPARTMENT OF  
AGRICULTURE.

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# LIST OF WORKERS IN SUBJECTS PERTAINING TO AGRICULTURE, HOME ECONOMICS, AND MARKETING.

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## UNITED STATES DEPARTMENT OF AGRICULTURE.

(Prepared in the Division of Publications, EDWY B. REID, *Chief.*)

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### OFFICE OF THE SECRETARY.

#### **Secretary of Agriculture, DAVID F. HOUSTON.**

The Secretary of Agriculture is charged with the work of promoting agriculture in its broadest sense. He exercises general supervision and control over the affairs of the department and formulates and establishes the general policies to be pursued by its various branches and offices.

#### **Assistant Secretary of Agriculture, G. I. CHRISTIE.<sup>1</sup>**

#### **Assistant Secretary of Agriculture, CLARENCE OUSLEY.<sup>1</sup>**

#### **Assistant to the Secretary, ALONZO E. TAYLOR.**

Dr. Taylor is the representative of the Secretary of Agriculture on the War Trade Board.

#### **Assistant to the Secretary, FLOYD R. HARRISON.**

#### **Assistant to the Secretary, JUNIUS F. COOK.**

Mr. Cook acts as the immediate representative of the Secretary in the execution of the powers conferred upon him by the President's proclamation of May 14, 1918, with reference to the licensing of the farm-equipment industry.

#### **Chief Clerk, ROBERT M. REESE.**

The Chief Clerk has general supervision of clerks and employees; of the order of business of the department and of records of the Secretary's office; and of expenditures from appropriations for miscellaneous expenses, rents, etc. He is responsible for the enforcement of the general regulations of the department and is custodian of buildings.

#### **Office of the Solicitor. W. M. WILLIAMS, *Solicitor*; Chief Clerk, A. McNAUGHT.**

The Solicitor is the legal adviser of the Secretary and the heads of the several branches of the department. He directs and supervises all law work of the department.

#### **Administrative and Game Laws Section. R. W. WILLIAMS, *Assistant to the Solicitor*, and Acting Solicitor in absence of Solicitor, in charge.**

This section attends to the administration of the general affairs of the office not specifically included in other sections; also prepares reports of violations, briefs, and memoranda, aids in drafting regulations, and assists in the trial of cases under the Lacey Act, migratory bird law, Alaska game law, and bird reserves law.

#### **National Forests, Plant Quarantine, and Federal Aid Road Act Section. FRED LEES, Assistant to the Solicitor, in charge.**

This section does the law work arising from business of the Forest Service, including contests of claims to lands in the national forests under homestead, mineral, and other laws, cases arising out of timber, fire, fencing, and other trespasses on the national forests, opinions to the Forester and review of opinions presented to the district foresters by assistants to the Solicitor in the field, and various other legal matters connected with the national forests, such as drafting of contracts, regulations, and forms, correspondence with the Attorney General and Secretary of the Interior, and miscellaneous correspondence; prepares reports of violations, briefs, and memoranda, aids in

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<sup>1</sup> These positions were created for the period of the war.

drafting regulations, and assists in the trial of cases under the plant quarantine law; also handles legal questions and aids in drafting regulations, forms, and agreements under the Federal Aid Road Act.

*Meat Inspection, Animal Quarantine, and Transportation Laws, Patent, and Contract Section.* C. W. BOYLE, *Assistant to the Solicitor, in charge.*

This section prepares reports of violations, briefs, and memoranda, aids in drafting regulations, and assists in the trial of cases under the meat-inspection, animal quarantine, 28-hour, other animal transportation and virus laws, and drafts informations and indictments in the quarantine and virus cases; also draws bonds, contracts, leases, and other agreements; and prosecutes applications of department employees for patents.

*Food and Drugs and Seed Importation Laws Section.* P. D. CRONIN, *Assistant to the Solicitor, in charge.*

In connection with the Federal Food and Drugs Act, this section prepares recommendations to United States attorneys for seizures, drafts informations and indictments in criminal cases, assists in the trial of important or technical cases, both civil and criminal, prepares notices of judgments, and aids in the conduct of public hearings and in drawing regulations, food-inspection decisions, and other rulings; also prepares reports of violations, briefs, and memoranda, aids in drafting regulations, and assists in the preparation for trial of cases under the Seed Importation Act.

*Insecticide and Fungicide Law Section.* O. H. GATES, *Assistant to the Solicitor, in charge.*

In connection with the Federal Insecticide Act, this section prepares recommendations to United States attorneys for seizures, drafts information, and indictments in criminal cases, assists in the trial of important or technical cases, both civil and criminal, prepares notices of judgments, and aids in drawing regulations, insecticide decisions, and other rulings; also compiles, and revises from time to time, the "Laws Applicable to the United States Department of Agriculture," and handles claims for balances due estates of deceased employees.

*Marketing and Rural Organization Section.* E. B. QUIGGLE, *Assistant to the Solicitor, in charge.*

This section handles law work in connection with the United States cotton futures act, the United States grain standards act, the United States warehouse act, the standard container act, the food products inspection law, and questions arising under the food control act relating to the licensing of stockyards and dealers thereon and the licensing of manufacturers of, and dealers in, fertilizers and farm equipment; advises the Bureau of Markets regarding the legality of various types of cooperative organizations, and concerning legal problems relative to the marketing and distribution of farm products and rural credits; conducts general correspondence and compiles laws relating to these subjects; also handles miscellaneous legal questions.

*Acquisition of Lands Section.* A. H. MCCONVILLE, *Assistant to the Solicitor, in charge.*

In connection with the acquisition of lands under the Weeks forestry law (act of Mar. 1, 1911), this section prepares agreements of purchase, supervises and directs the work of title attorneys engaged in the examination of titles, assists United States attorneys in the conduct of condemnation proceedings, and handles correspondence with the Attorney General relating thereto.

*Assistants to the Solicitor, Stationed in the Field.*

Branches of the Office of the Solicitor are located at Missoula, Mont., in charge of D. F. McGowan; Denver, Colo., in charge of George E. Trowbridge; Albuquerque, N. Mex., in charge of M. M. Cheney; Ogden, Utah, in charge of J. F. Lawson; San Francisco, Cal., in charge of H. P. Dechant; and Portland, Oreg., in charge of W. F. Staley. These officers are legal advisers to the district foresters and handle the law work of the Forest Service in the field, besides such local legal work of the department as may be assigned them by the Solicitor.

**Office of Farm Management.** R. L. ADAMS, *Acting Chief;* Dr. J. I. FALCONER, Dr. H. C. TAYLOR, and Dr. G. F. WARREN, *Collaborators;* LISLE MORRISON, *Assistant to the Chief.*

[Those whose names are starred (\*) are on furlough for military service.]

This office studies the details of farm practice. Its main object is to improve farm practice by introducing better business methods and by applying the principles of science wherever they are known. The types of farming prevailing in the various sections of the country are being studied in a number of localities, and a detailed study of farm economics and business principles is being made.

*Scientific staff.*—J. H. Arnold, O. E. Baker, G. A. Billings, E. A. Boeger, D. A. Brodie, Junius S. Cates, Levi Chubbuck, R. W. Clothier, J. S. Cotton, M. A. Crosby,

J. A. Drake, C. L. Goodrich, Byron Hunter, S. O. Jayne, J. M. Johnson, H. B. McClure, A. D. McNair, H. A. Miller, L. A. Moorhouse, A. G. Smith, E. V. Wilcox, and E. O. Wooton, agriculturists; F. H. Branch, L. G. Connor,\* H. M. Dixon, W. C. Funk, Earl S. Haskell, C. E. Hoke, F. D. Stevens, and R. N. Thomson, assistant agriculturists; H. H. Clark, H. W. Hawthorne, R. D. Jennings,\* Oscar A. Juve, Bruce McKinley, Frank Montgomery, J. M. Purdom, jr., L. A. Reynoldson, John C. Rundles, C. F. Sarle, F. H. Shelladay, Earl D. Strait,\* T. H. Summers, C. C. Taylor, H. R. Tolley, H. A. Turner, and Jay Whitson, scientific assistants; J. S. Ball, Lillian Church, M. R. Cooper, and Raymond S. Washburn,\* assistants in farm-cost accounting; H. H. Mowry, assistant in dry-land agriculture; C. W. Cranford, assistant in farm equipment; C. L. Holmes, R. R. Spafford, and Oscar C. Stine, assistants in farm economics; H. E. Anderson,\* specialist in agricultural economics; Raymond Evans, editor in farm management; Francis Joseph Marschner, cartographer; R. L. Gillett, De F. Hungerford, S. W. Mendun, W. I. Myers, F. W. Peck, and E. H. White, agents.

**Publication Activities.** The functions of the Office of Information and the Division of Publications are given on page 34.

**Office of Inspection.** ALEX. MCC. ASHLEY, *in charge*.

Handles personnel matters; is charged with the accounting and administrative examination of claims and the preparation of financial reports involving appropriations under the Office of the Secretary; and assists in the fiscal operation of the bureaus.

**Forest Appeals.** THOMAS G. SHEARMAN, *in charge*.

This officer investigates for the Secretary of Agriculture appeals from decisions of the Forest Service, and reports his findings to the Secretary.

**Appointment Clerk.** P. L. GLADMON.

The Appointment Clerk prepares all papers connected with appointments, transfers, promotions, reductions, details, furloughs, and removals, and has charge of correspondence with the Civil Service Commission. He is the custodian of oaths of office and personnel reports. He has the custody and use of the department seal.

**Office of Exhibits.** F. LAMSON-SCRIBNER, *Special Agent on Exhibits*.

The Office of Exhibits handles the correspondence of the department relative to exhibits at fairs and expositions of various kinds; cooperates with the several branches of the department in preparing exposition material; ships, installs, and cares for such exhibits; and investigates methods of displaying them.

#### WEATHER BUREAU.

**Chief.** CHARLES F. MARVIN; **Assistant Chief.** C. C. CLARK; **Chief Clerk.** EDGAR B. CALVERT.

The Weather Bureau has charge of the forecasting of the weather; the issue and display of weather forecasts and storm, cold-wave, frost, and flood warnings; the gauging and reporting of river stages; the maintenance and operation of the United States Weather Bureau telegraph and telephone lines; the collection and transmission of marine intelligence for the benefit of commerce and navigation; the reporting of temperature and rainfall conditions for agricultural interests; and the taking of such meteorological and seismological observations as may be necessary to determine and record the climatic and seismic conditions of the United States.

**Forecast Division.** HENRY E. WILLIAMS, *in charge*.

This division receives and charts, twice daily, telegraphic reports of the prevailing weather conditions and issues a statement of impending weather changes in all parts of the country. In the case of severe disturbances warnings are issued to special storm-warning stations along the Lakes and the seacoast.

**River and Flood Division.** ALFRED J. HENRY, *in charge*.

This division has charge of the collection of information as to stages of water along the navigable rivers and the issue of flood warnings. It gathers information on the depth of snowfall in the mountains of the West, for a study of the flow of water in the streams supplying irrigation projects, and on the rate of evaporation from ponds and lakes, in the interest of water storage for irrigation, power development, and navigation. It supervises, on the part of the Weather Bureau, the experiment stations maintained jointly by the Weather Bureau and the Forest Service.

**Division of Agricultural Meteorology.** J. WARREN SMITH, *in charge*.

This division conducts studies regarding the relation of weather to crops, and collects statistical data required in such studies, having the direction and supervision of cooperative relations with the State experiment stations and other contributing organiza-

tions. It supervises the work of about 400 special stations, maintained in connection with the corn, wheat, cotton, sugar, rice, tobacco, fruit, and cattle industries. The division supervises the distribution of special warnings for the benefit of growers of certain crops. Data showing the current weather conditions throughout the country and the effects of those conditions upon important crops are collected and published weekly during the principal crop-growing season and monthly during the remainder of the year; and the issue of weather crop summaries at the various State centers is supervised.

**Climatological Division.** PRESTON C. DAY, *in charge.*

This division has charge of the collection, study, and publication of climatological data for the United States. It has general supervision of the work of about 4,200 cooperative stations and about 42 special meteorological stations. From these stations are collected the records of daily observations of temperature, precipitation, and other meteorological conditions necessary to establish the history of the climate of the various portions of the United States. It also supervises the equipment and personnel of stations maintained in connection with the principal agricultural activities of the country. The division has supervision of a bulletin issued weekly during the winter months, showing depth of snow on ground, and thickness of ice in rivers and harbors, and from time to time issues special bulletins or papers bearing on climatological subjects. It has charge of the preparation of the climatological portions of the annual reports of the bureau, and supervises the monthly and annual summaries and other publications of the climatological services of the various States. This division has charge of the barometry of the United States, and of the preparation of the normals of pressure, temperature, precipitation, etc. It also collates from reports of marine observers meteorological information pertaining to the oceans, and is charged with the supervision of the radiotelegraph weather service of the Atlantic and Pacific coasts.

**Instrument Division.** BENJAMIN C. KADEL, *Chief.*

Has supervision of the maintenance of a high standard of instrumentation and equipment for the meteorological and seismological observational work of the Bureau generally, involving the supervision of the installation and methods of use of the instruments and equipment required for meteorological observations of the Bureau in the field; the installation and maintenance of the display equipment of storm-warning stations; supervision of all evaporation work; installation and maintenance of automatic river gages, including the adjustment and application of corrections to instruments in the hands of observers in the field; problems relating to protection from lightning.

**Section of Tests and Repairs.** STERLING P. FERGUSSON, *in charge.*

Has charge of the testing, standardizing, and repairing of all apparatus, and the designing and constructing of new instrumental equipment required for the work of the Weather Bureau.

**Telegraph Division.** S. PERCY MINNICK, *Chief.*

This division receives and transmits all telegrams, arranges and controls telegraph circuits, maintains and repairs United States Weather Bureau telegraph and telephone lines and submarine cables, and examines all telegraph accounts.

**Library.** CHARLES F. TALMAN, *in charge.*

The library includes standard works of reference and technical books on meteorology and allied sciences and a complete file of the publications of meteorological and climatological services in all parts of the world. A catalogue is prepared of the meteorological contents of all the principal scientific periodicals of the world, including proceedings and transactions of societies. Translations from foreign languages are made in the library.

**Office of the Editor.** HERBERT H. KIMBALL, *in charge.*

This office edits and supervises the publication of the Monthly Weather Review; it also has general editorial supervision over scientific and semiscientific papers submitted for publication by the bureau, calling attention to such of these as seem appropriate for the Monthly Weather Review or the Journal of Agricultural Research, the daily press, etc. It prepares such summaries and indexes as may be necessary and also notes on the progress of meteorology.

**Printing Division.** ROBERT SEYBOTH, *Chief.*

The division prints and mails the daily weather map and the various charts and miscellaneous printed matter pertaining to the bureau and has the custody of and distributes station forms.

**Division of Supplies.** BENJAMIN A. BLUNDON, *Chief.*

This division purchases and issues supplies and is charged with the safe-keeping of all property belonging to the bureau.

**Stations and Accounts Division.** DELOS T. MARING, *Chief.*

This division audits, adjusts, and prepares for payment all accounts and claims against the bureau; prepares advertisements; issues requests for passenger transportation; prepares the annual estimates of appropriations; transacts all business relating to the financial interests of the bureau; and supervises the construction of Weather Bureau buildings outside of Washington, including repairs thereto.

**Solar Radiation Investigations.** HERBERT H. KIMBALL, *in charge.*

Principally concerned with measurements of the rate at which heat is received at the surface of the earth by radiation during the day from the sun and sky combined and from each source separately; also that lost at night, and the relation of these measurements to atmospheric conditions.

**Seismological Investigations.** WILLIAM J. HUMPHREYS, *in charge.*

These investigations include the collection and study of both instrumental records and personal observations of earthquake phenomena throughout the United States. One of the immediate objects in view is the detailed mapping of the country with reference to existing faults on the lines of weakness of the earth's crust as evidenced by breaks or movements thereon that occasionally take place, causing small local earthquakes. Such maps are of interest to those who have occasion to locate dams and similar important permanent structures.

**Aerological Investigations.** WILLIS R. GREGG, *in charge.*

This work includes the making of upper air observations at certain field stations by means of kites, and the reduction, study, and publication of the data thus obtained, with the view to extending our knowledge of the dynamics of the atmosphere. The principal observing stations at present are located at Drexel, Nebr., Ellendale, N. Dak., Broken Arrow, Okla., Royal Center, Ind., Groesbeck, Tex., and Leesburg, Ga. Upper air observations are also being made at aviation training camps of the Army by means of pilot balloons; the observations at the kite stations to be established as well as those at the aviation training camps to be largely in cooperation with the Army for the purpose of ascertaining wind conditions that may be experienced at different levels above the surface of the earth, and to secure such other information regarding free air conditions as may be of practicable value to aviators.

**Weather Bureau stations and work outside of Washington, D. C.**

This bureau maintains throughout the United States, in the West Indies, in Alaska, and in Hawaii about 200 meteorological stations employing from 1 to 15 men each.

For forecast purposes the United States is divided into districts comprising: (1) The upper Mississippi Valley and the northwest, Henry J. Cox, Chicago, Ill., in charge. (2) Louisiana, Texas, Arkansas, and Oklahoma, Isaac M. Cline, New Orleans, La., in charge. (3) Utah, Colorado, New Mexico, and Arizona, Frederick H. Brandenburg, Denver, Colo., in charge. (4) California, Nevada, Washington, Oregon, and Idaho, Edward A. Beals, San Francisco, Cal., in charge. (5) The remainder of the United States, forecaster on duty (Edward H. Bowie, Harry C. Frankenfield, or Alfred J. Henry), Washington, D. C., in charge.

For the collection and distribution of climatological data the United States, including Alaska, Porto Rico, and Hawaii, is divided into 45 sections, generally coextensive with States, which, with the names of the officials in charge and the section centers, are as follows:

Alabama: Patrick H. Smyth, Montgomery.

Alaska: Melvin B. Summers, Juneau.

Arizona: Robert Q. Grant, Phoenix.

Arkansas: Harvey S. Cole, Little Rock.

California: Edward A. Beals, San Francisco.

Colorado: Frederick H. Brandenburg, Denver.

Florida: Alexander J. Mitchell, Jacksonville.

Georgia: Charles F. von Herrmann, Atlanta.

Hawaii: Lawrence H. Daingerfield, Honolulu.

Idaho: Clinton E. Norquest, Boise.

Illinois: Clarence J. Root, Springfield.

Indiana: John H. Armington, Indianapolis.

Iowa: Charles D. Reed, Des Moines.

Kansas: Snowden D. Flora, Topeka.

Kentucky: Ferdinand J. Walz, Louisville.

Louisiana: Isaac M. Cline, New Orleans.

Maryland and Delaware: Oliver L. Fassig, Baltimore, Md.

Michigan: Charles F. Schneider, Grand Rapids.

Minnesota: Ulysses G. Purssell, Minneapolis.

Mississippi: Robet T. Lindley, Vicksburg.  
 Missouri: George Reeder, Columbia.  
 Montana: William T. Lathrop, Helena.  
 Nebraska: George A. Loveland, Lincoln.  
 Nevada: Henry F. Alps, Reno.  
 New England: John W. Smith, Boston, Mass.  
 New Jersey: G. Harold Noyes, Trenton.  
 New Mexico: Charles E. Linney, Santa Fe.  
 New York: Wilford M. Wilson, Ithaca.  
 North Carolina: Lee A. Denson, Raleigh.  
 North Dakota: Orris W. Roberts, Bismarck.  
 Ohio: William H. Alexander, Columbus.  
 Oklahoma: J. Pemberton Slaughter, Oklahoma.  
 Oregon: Edward L. Wells, Portland.

Pennsylvania: George S. Bliss, Philadelphia.  
 Porto Rico: F. Eugene Hartwell, San Juan.  
 South Carolina: Richard H. Sullivan, Columbia.  
 South Dakota: Montello E. Blystone, Huron.  
 Tennessee: Roscoe Nunn, Nashville.  
 Texas: Bernard Bunnemeyer, Houston.  
 Utah: J. Cecil Alter, Salt Lake City.  
 Virginia: Edward A. Evans, Richmond.  
 Washington: George N. Salisbury, Seattle.  
 West Virginia: Henry C. Howe, Parkersburg.  
 Wisconsin: William P. Stewart, Milwaukee.  
 Wyoming: George W. Pitman, Cheyenne.

#### BUREAU OF ANIMAL INDUSTRY.

[Those whose names are starred (\*) are on furlough for military service.]

*Chief, JOHN R. MOHLER; Assistant Chief, B. H. RAWL; Chief Clerk, CHARLES C. CARROLL.*

The Bureau of Animal Industry has charge of the work of the department relating to the live-stock industry. In general it deals with the investigation, control, and eradication of diseases of animals, the inspection and quarantine of live stock, the inspection of meat and meat food products, and with animal husbandry and dairying.

**Animal Husbandry Division.** *GEORGE M. ROMMEL, Chief.*

This division studies the breeding and feeding of farm animals and poultry, and passes upon the pure breeding of animals imported into the United States for breeding purposes. The division is engaged in work in cooperation with the War Department in encouraging the breeding of horses for military purposes. It studies also poultry and egg production and methods of improving the quality of farm eggs, and is engaged in the organization of boys' and girls' pig and poultry clubs in cooperation with the States Relations Service of the department and State agricultural colleges.

*Animal genetics.*—Sewall Wright, in charge; O. S. Eaton.

*Beef cattle investigations.*—F. W. Farley, in charge; E. W. Sheets, Edith M. Curtiss, E. H. Thompson,\* Sherel M. Miller,\* E. W. Thomas.

*Horse and mule investigations.*—George A. Bell, John O. Williams, R. S. Whitfield.

*Poultry investigations.*—Harry M. Lamon, in charge; Rob R. Slocum, A. R. Lee, J. W. Kinghorne, D. M. Green, R. H. Wilkins,\* A. S. Chapin,\* E. O. Edson, D. L. Orr.

*Sheep and goat investigations.*—F. R. Marshall, in charge; H. E. Allen, R. B. Millen,\* J. F. Wilson, D. C. Davis,\* C. G. Potts.

*Swine investigations.*—E. Z. Russell, in charge; W. J. Carmichael, Frank G. Ashbrook,\* R. E. Gongwer, John Zeller, Geo. A. Anthony, Alva Wilson, Robt. E. Hutton.\*

*Animal husbandry extension work.*—Chief of Division, in charge; Dan T. Gray,\*\* John T. Caine, \*\* W. C. Coffey.\*

*Western investigations.*—George A. Scott.\*

*U. S. experimental farm, Beltsville, Md.*—Benjamin F. Brandon, acting assistant, in charge.

*U. S. Morgan horse farm, Middlebury, Vt.*—W. F. Hammond, in charge; H. H. Reese.

*U. S. sheep experiment station, Dubois, Idaho.*—V. O. McWhorter, in charge.

**Biochemic Division.** *M. DORSET, Chief.*

This division prepares tuberculin and mallein for free distribution to health officers for use in official tests; conducts experiments with the object of obtaining vaccines and antitoxins for animal diseases; carries on researches concerning the causes of certain infectious diseases; takes part in the control of viruses, serums, toxins, and analogous products intended for use in the treatment of domestic animals; carries on experiments with dips and disinfectants; and assists in enforcing the insecticide act of 1910 by examining articles intended for use in combating insects and fungi which infest domestic animals. It carries on bacteriological and chemical research work relative to meat and meat food products in connection with the meat inspection.

*Scientists in charge of sections.*—J. A. Emery, assistant chief and member of the Insecticide and Fungicide Board; C. N. McBryde, in charge of bacteriological investigations of meats; R. M. Chapin, in charge of dips and disinfectants; Ralph Hoagland, in

charge of biochemical investigations of meats; W. B. Niles, in charge of hog-cholera serum production.

**Dairy Division.** B. H. RAWL, *Chief*; C. W. LARSON, *Dairy Expert*.

This division collects and disseminates information concerning dairy farming, the care and improvement of dairy cattle, and the production, care, and distribution of dairy products. It is charged also with the details of administration of the laws concerning the inspection of factories and markets for "renovated" or "process" butter. It carries on research concerning the chemistry and bacteriology of dairy products and in engineering problems that affect various branches of the dairy industry. It also cooperates with State and local institutions in educational work in dairying.

*Miscellaneous.*—D. Stuart, dairy husbandry; H. P. Davis, editor; R. R. Graves, dairy cattle breeding; K. E. Parks and J. T. Bowen, dairy engineers; T. R. Pirtle, assistant in dairy manufacturing.

*Research laboratories.*—L. A. Rogers, in charge; S. H. Ayers, C. A. Cary, W. M. Clark, P. W. Clemmer, A. O. Dahlberg, E. F. Deysher, F. R. Evans, K. J. Matheson, C. L. McArthur, E. B. Meigs, C. S. Mudge, P. Rupp, R. H. Shaw, J. M. Sherman, A. C. Weimar, O. E. Williams, P. A. Wright, H. F. Zoller.

*Dairy farming investigations and demonstrations.*—Helmer Rabild, in charge; R. F. Flint, J. B. Shepherd. This work includes: (1) Southern Dairying: J. H. McClain, in charge; H. E. Baker, S. B. Durham, W. H. Eaton, C. M. Evans, C. A. Hutton, J. F. Lamasster, T. W. Moseley, R. L. Pou, J. P. Quinerly, A. J. Reed, A. E. Talbot. (2) Dairy work in tick-free areas: J. A. Arey, H. T. Converse, E. T. McClure, C. E. Newlander, C. R. Painter, C. W. Radway, W. H. Woodley. (3) Dairy community development: R. R. Welch. (4) Cow-testing associations and bulk associations, and dairy work with county agents: J. Ausen, J. W. Bartlett, C. L. Blackman, H. E. Bremer, F. L. Brown, E. F. Burton, R. D. Canan, H. W. Cave, R. B. Cooley, E. V. Ellington, E. J. Haslerud, W. L. Kellogg, Ivan McKellip, W. A. McKerrow, N. A. Negley, W. E. Peterson, D. H. Propps, W. A. Rhea, H. C. Searles, H. E. Smith, J. A. Waldron, J. G. Winkler, G. E. Wollcott. (5) Dairy demonstration farm in Texas: A. M. Gooduan.

*Dairy manufacturing investigations and renovated-butter inspection.*—S. C. Thompson, in charge; William White assistant; G. R. Campbell, Lee Coe, W. L. Clevenger, Thomas Corneliuson, L. S. Edwards, F. R. Farnham, C. M. Gere, R. R. Hogue, Chris. Johnson, V. R. Jones, J. C. Joslin, L. H. Marlatt, H. S. Merry, D. R. Noland, F. L. Odell, M. P. A. Sondergaard, O. A. Storwick, G. N. Tobey, J. L. Thomas.

*Market-milk investigations.*—Ernest Kelly, in charge; J. B. Bain, G. E. Braun, L. H. Burgwald, C. E. Clement, L. B. Cook, R. P. Hotis, C. S. Leete, C. S. MacBride, R. J. Posson, R. S. Smith, G. B. Taylor, H. N. Thomas, Benjamin Vener, W. D. Wood.

*Western dairy investigations.*—J. E. Dorman, in charge; F. R. Cammack, B. R. Eldredge, G. E. Frevert, C. F. Hoyt, F. W. Kehrl, V. E. Scott, W. E. Tomson, J. E. Watt, E. L. Westover.

*Beltsville farm.*—T. E. Woodward, superintendent; J. B. McNulty, assistant.

*Metabolism in dairy cows.*—H. P. Armsby, in charge; W. W. Braman, J. A. Fries.

*Experiments and demonstrations in live-stock production.*—Iberia Live Stock Farm, Jeanerette, La.; J. R. Quesenberry, superintendent; H. P. Davis, Arthur Fischer, R. R. Graves, L. O. Shockley. Live Stock Extension Service: A. F. Rolf, in charge; L. P. McCann, J. B. Francioni, C. H. Staples.

*Experiments in dairying and live-stock production in Western United States.*—B. H. Rawl, H. P. Davis, R. R. Graves, Melvin Moss, L. J. Ridings.

**Field Inspection Division.** A. W. MILLER, *Chief*; S. O. FLADNESS, *Assistant*.

This division, in cooperation with State authorities, is charged with the work of eradicating scabies in cattle and sheep and dourine in horses. It has supervision over the interstate transportation of live stock, including inspection, disinfection, certification, etc.; also the details of administering the 28-hour law governing the humane handling of live stock in transit; and the mallein testing of horses for interstate movement.

*Inspectors in charge of scabies and dourine eradication in the field.*—A. J. Payne, Sacramento, Cal.; J. C. Exline, Walla Walla, Wash.; F. E. Murray, Salt Lake City, Utah; F. L. Schneider, Albuquerque, N. Mex.; W. E. Howe, Denver, Colo.; H. H. Cohenour, Bismarck, N. Dak.; W. S. Newman, San Angelo, Tex.; B. W. Murphy, Topeka, Kans.; J. O. Wilson, Pierre, S. Dak.; Rudolph Snyder, Helena, Mont.

**Meat Inspection Division.** R. P. STEDDOM, *Chief*.

The work of the Meat Inspection Division includes the ante-mortem and post-mortem inspection of cattle, sheep, swine, and goats slaughtered at establishments engaged in interstate or foreign commerce; the supervision of such establishments and of the

various processes of preparing, curing, canning, packing, etc., so as to insure sanitary conditions, equipment, and methods; the laboratory examination of meat and products and all ingredients used in the preparation thereof; the condemnation and proper disposal of carcasses and products found to be diseased, unwholesome, or otherwise unfit for human food; the marking and certification of meats and products that have been inspected and passed; and the regulation and supervision of the interstate transportation, exportation, and importation of meats and meat food products.

**Assistants.**—George Ditewig, in charge of western division; A. J. Pistor, in charge of eastern division; T. M. Price, in charge of laboratories; G. H. Parks, expert in sanitation; F. W. Meyst, in charge of labeling.

A directory showing the 240 meat-inspection stations and inspectors in charge may be obtained on application to the bureau.

**Miscellaneous Division.** A. M. FARRINGTON, *Chief*; GEORGE H. RUSSELL, *Assistant in charge of Appointment Section*.

This division keeps the records of the projects of work in which the bureau is engaged; has charge of the work relating to the personnel, such as appointments, transfers, assignments to duty, efficiency records, etc.; endeavors to promote veterinary education and to assist veterinary colleges in providing adequate courses of instruction to qualify men for the veterinary service of the bureau; and attends to miscellaneous duties.

**Pathological Division.** JOHN S. BUCKLEY, *Acting Chief*.

This division conducts scientific investigations of animal diseases; carries on experiments with immunizing agents for the purpose of protecting animals against disease; cooperates with the State agricultural experiment stations with a view to combating diseases peculiar to the localities; determines pathological specimens referred to the division for diagnosis; prepares and distributes blackleg vaccine; and investigates effects of poisonous plants on live stock.

**Scientific staff.**—H. J. Washburn, senior bacteriologist; Robert J. Formad, pathologist; B. A. Gallagher, bacteriologist in charge of investigations concerning diseases of poultry; L. T. Giltner, in charge of investigations of miscellaneous diseases of animals; J. M. Buck, bacteriologist in charge of investigations in contagious abortion; G. T. Creech, assisting in contagious abortion investigations; H. H. Ladson, field investigations in contagious abortion; W. L. Williams, cooperating in investigations in contagious abortion; H. W. Schoening, in charge of investigations in dourine and glanders; F. H. Reynolds, assisting in investigations in dourine and glanders; W. S. Gochenour, bacteriologist; C. B. Breininger, in charge of blackleg investigations; R. A. Kelser, in charge of testing bacteriological products; W. N. Berg, physiologist and chemist; Herbert Bunyea, assistant in bacteriology; C. D. Marsh, in charge of poisonous-plant investigations; A. B. Clawson, physiologist in poisonous-plant investigations; J. F. Couch, junior chemist in poisonous-plant investigations; H. C. Campbell, in charge of experiments in cooperation with Pennsylvania Live Stock Sanitary Board; L. Enos Day, in charge of branch pathological laboratory at Chicago, Ill.; George Byron Morse, in charge of branch pathological laboratory at South Omaha, Nebr.; George W. Stiles, in charge of branch pathological laboratory, Denver, Colo.

**Quarantine Division.** RICHARD W. HICKMAN, *Chief*; GEORGE W. POPE, *Assistant Chief*.

The inspection and quarantine of imported animals with a view to excluding contagion, the management of the animal quarantine stations, and the inspection of live stock for export come under this division. The ships carrying exported animals are also inspected, and regulations as to fittings, equipment, ventilation, feed, water, attendants, etc., are enforced. The Quarantine Division administers the sanitary regulations governing the importation of hides and skins, glue stock, hair, wool, and other animal by-products, hay, straw, forage, etc., and directs the tuberculin testing of cattle and the mallein testing of horses for export and import.

**Tick Eradication Division.** R. A. RAMSEY, *Chief*; W. P. ELLENBERGER, *Assistant*.

This division, in cooperation with State live-stock sanitary organizations in the Southern States, is charged with the work of eradicating ticks which infest cattle and transmit disease. It also has supervision of the interstate movement of cattle from the area under quarantine for cattle ticks.

**Inspectors in charge of tick eradication in the field.**—L. J. Allen, Oklahoma, Okla.; Harry Grafke, Fort Worth, Tex.; J. B. Reidy, Houston, Tex.; Marvin Gregory, Little Rock, Ark.; E. I. Smith, Baton Rouge, La.; R. E. Jackson, Birmingham, Ala.; J. A. Barger, Jackson, Miss.; W. M. MacKellar, Atlanta, Ga.; E. M. Nighbert, Jacksonville, Fla.; W. K. Lewis, Columbia, S. C.; Hartwell Robbins, Washington, N. C.

**Tuberculosis Eradication Division.** J. A. KIERNAN, *Chief*; A. E. WIGHT, *Assistant*.

This division, in cooperation with State authorities, is charged with the work of eradicating tuberculosis of farm animals. It has supervision over the tuberculin testing of cattle for interstate movement.

*Inspectors in charge of tuberculosis eradication in the field.*—H. B. Leonard, Albany, N. Y.; F. L. Schneider, Albuquerque, N. Mex.; Wm. M. MacKellar, Atlanta, Ga.; R. E. Jackson, Birmingham, Ala.; H. H. Cohenour, Bismarck, N. Dak.; E. A. Crossman, Boston, Mass.; J. J. Lintner, Chicago, Ill.; W. R. Van Ness, Clarksburg, W. Va.; W. K. Lewis, Columbia, S. C.; W. E. Howe, Denver, Colo.; F. H. Thompson, Des Moines, Iowa; H. Grafke, Fort Worth, Tex.; P. E. Quinn, Harrisburg, Pa.; Rudolph Snyder, Helena, Mont.; J. E. Gibson, Indianapolis, Ind.; J. A. Barger, Jackson, Miss.; T. J. Eagle, Kansas City, Kans.; T. E. Rich, Lansing, Mich.; Marvin Gregory, Little Rock, Ark.; J. S. Healy, Madison, Wis.; A. J. De Fosset, Montpelier, Vt.; W. B. Lincoln, Nashville, Tenn.; R. W. Tuck, New Orleans, La.; W. C. Drake, jr., Oklahoma City, Okla.; H. Busman, Omaha, Nebr.; J. O. Wilson, Pierre, S. Dak.; Sam B. Foster, Portland, Oreg.; R. E. Brookbank, Richmond, Va.; A. J. Payne, Sacramento, Cal.; W. J. Fretz, St. Paul, Minn.; F. E. Murray, Salt Lake City, Utah; J. G. Fish, Tallahassee, Fla.; W. G. Middleton, Trenton, N. J.

**Zoological Division.** B. H. RANSOM, *Chief*.

This division investigates diseases of parasitic origin, collects and describes animal parasites of all kinds, determines such parasites as are sent to the bureau for identification, and keeps a card index of animal parasites and a bibliography of literature relating to them.

*Scientific staff.*—Albert Hassall, assistant zoologist; Howard Crawley, in charge of investigations of parasitic protozoa; Benjamin Schwartz, junior zoologist; Lawrence Avery, veterinarian; Marion Imes, in charge of investigations on the treatment and control of external parasites, Kansas City, Kans.; Cooper Curtice, in charge of experiments in the eradication and control of internal parasites of sheep, Vienna, Va.

**Office of Hog-Cholera Control.** O. B. HESS, *in Charge*; T. P. WHITE, *Assistant*.

The work of this office has for its object the suppression and control of hog cholera. The work is conducted in cooperation with the educational forces of agricultural colleges and State regulatory authorities legally charged with the investigation, control, and eradication of contagious and infectious diseases of live stock.

*Inspectors in charge of hog-cholera control and eradication in the field.*—A. L. Hirleman, Atlanta, Ga.; R. J. W. Briggs, Baton Rouge, La.; J. B. Hollenbeck, Bismarck, N. Dak.; C. F. Hartman, Columbia, S. C.; I. K. Atherton, College Park, Md.; C. H. York, Columbus, Ohio; C. F. Harrington, Denver, Colo.; J. S. Koen, Des Moines, Iowa; M. Zurkow, Dover, Del.; L. E. Epple, Fort Worth, Tex.; W. F. Biles, Frankfort, Ky.; Rudolph Snyder, Helena, Mont.; C. H. Hays, Indianapolis, Ind.; H. L. Fry, Jackson, Miss.; Ralph Graham, Jefferson City, Mo.; H. M. Newton, Lansing, Mich.; S. E. Cosford, Lincoln, Nebr.; Joe H. Bux, Little Rock, Ark.; J. T. Purcell, Madison, Wis.; H. C. Wilson, Troy, Ala.; Robert Jay, Nashville, Tenn.; T. M. Owen, Norfolk, Va.; J. P. O'Connor, Oklahoma City, Okla.; J. P. Jacks, Phoenix, Ariz.; F. D. Owen, Raleigh, N. C.; A. J. Payne, Sacramento, Cal.; R. N. Mead, Salt Lake City, Utah; James McDonald, Springfield, Ill.; L. E. Lyons, Tallahassee, Fla.; B. W. Murphy, Topeka, Kans.; W. A. Sullivan, Twin Falls, Idaho.

*Inspectors in charge of educational hog-cholera work in the field.*—E. S. Brashier; J. W. Logan, Berkeley, Cal.; G. S. Weaver, Brookings, S. Dak.; L. P. Beechy, Columbus, Ohio; G. A. Wright, Fort Collins, Colo.; A. H. Logan, Gainesville, Fla.; H. H. Fairbank, Morgantown, W. Va.; George M. Potter, Manhattan, Kans.; C. L. Nelson, Stillwater, Okla.; E. P. Johnson, State College, N. Mex.; H. W. Willis, Columbia, Mo.

**Office of Virus-Serum Control.** H. J. SHORE, *in Charge*; D. I. SKIDMORE, *Assistant*.

This office is charged with the enforcement of the virus-serum-toxin act of 1913, which regulates the preparation, sale, barter, exchange, shipment, and importation of all viruses, serums, toxins, and analogous products intended for use in the treatment of domestic animals. United States veterinary licenses are issued for the preparation of veterinary biological products at domestic establishments, and United States veterinary permits are issued to importers of such products. Inspections are made of the establishments of all firms making application for license. This inspection covers the construction and equipment of the plant, the methods employed in the preparation of products, and the manner of keeping records. General supervision over the preparation and testing of all products is maintained in order to insure, so far as possible, that the products are not worthless, contaminated, dangerous, or harmful within the meaning of the act.

**Experiment Station.** E. C. SCHROEDER, *Superintendent.*

The Experiment Station of the bureau is located at Bethesda, Md. It conducts investigations of animal diseases with a view to their control and eradication and their bearing on the public health. A small farm is maintained in such a manner as to provide the other divisions of the bureau with facilities for making observations for which large domestic animals are needed. The work of the station consists of both independent original investigations and investigations in cooperation with and supplemental to those of the other divisions.

W. E. Cotton, *assistant superintendent*; George W. Brett, *scientific assistant.*

**Editorial Office.** D. S. BURCH, *Editor.*

This office edits manuscripts prepared in the bureau, compiles and prepares information and material for publications and other uses, attends to correspondence relating to publications and miscellaneous subjects, makes translations, reads proof, duplicates circular letters, etc.

**FOREST SERVICE.**

[Those whose names are starred (\*) are on furlough for military service.]

**Forester,** HENRY S. GRAVES; *Associate Forester,* ALBERT F. POTTER; *Assistant Foresters,* WILLIAM L. HALL and E. A. SHERMAN; *Forest Inspector,* ARTHUR C. RINGLAND.\*

The Forest Service administers the national forests, studies forest conditions and methods of forest utilization, investigates the mechanical and physical properties of woods and the processes employed in the manufacture of forest products, and gathers information concerning the needs of the various wood-using industries and the relation of forests to the public welfare generally.

The work of the Forest Service is organized under the Office of the Forester, 5 branches, 7 districts, 151 national forests, and 11 purchase areas.

**Office of the Forester.**D. D. BRONSON, A. O. WAHA, and ALLEN S. PECK,\* *Forest Inspectors*; G. G. ANDERSON, *Assistant to the Forester.*

This office has general supervision of estimates and allotments, personnel, quarters, equipment and supplies, and of fire protection and permanent improvement work on the national forests.

**Maintenance.** BILLIE I. SHANNON, *Chief.*

The work of this office includes all matters relating to the care of quarters and the purchase and custody of supplies, furniture, instruments, and other equipment in Washington, D. C.

**Office of the Editor.** HERBERT A. SMITH, *Editor*; L. C. EVERARD, *in charge of technical review*; PAUL D. KELLETER, *in charge of information*; C. M. BALLARD, *in charge of proofs and forms.*

This office disseminates information concerning forestry through the public press and other channels and performs the editorial and educational work of the service, including the review and proof reading of publications and forms; cooperation with teachers, officers of public instruction, and others; the preparation, installation, and care of forest exhibits; and the care and use of the lantern-slide and photograph collections.

**Dendrologist.** GEORGE B. SUDWORTH.

The dendrologist is charged with investigations relating to the life history of native and exotic forest trees, their geographic distribution, distinguishing characteristics, habits and associations in the formation of forests, etc.; also the selection, adaptation, and care of trees for shade and ornamental purposes.

**Accounts.** M. E. FAGAN, *Chief.*

This office is in charge of all fiscal affairs pertaining to the Forest Service—general bookkeeping, controlling accounts, allotments, and liabilities, and all operations of district fiscal agents.

**Supply Depot, Ogden, Utah.** A. H. COUSINS, *Property Assistant.***Property Audit, Ogden, Utah.** J. G. FALCK, *Property Auditor.*

**Branch of Silviculture.**

**W. B. GREELEY,\* Assistant Forester; R. Y. STUART,\* Forest Inspector; E. E. CARTER, Assistant Forester in Charge; C. G. SMITH, Forest Inspector; HARRY IRION, Office Assistant.**

Through the district foresters the Branch of Silviculture has supervision of timber sales, timber and fire trespass, and reforestation on the national forests, and of working plans for their better administration. It cooperates with the States and private owners in fire protection and the practice of forestry.

**State Cooperation.** *J. G. PETERS, Chief.*

This office, in cooperation with the States, investigates forest conditions and suggests needed legislation and forest policies; prepares digests of State forest laws; cooperates with a number of States, under the Weeks law (act of Mar. 1, 1911), in the protection of the watersheds of navigable streams; directs expenditures for this purpose; and inspects the work done in the field.

*Inspection.*—L. S. Murphy, J. A. Mitchell.

**Development of Private Forestry.** *E. S. BRYANT,\* Chief; AUSTIN CARY, Logging Engineer.***Branch of Grazing.**

**WILL C. BARNES, Assistant Forester in charge; J. W. NELSON, Inspector of Grazing.**

The Branch of Grazing has, through the district foresters, general supervision of the range in the national forests. When the number of stock to be allowed on each national forest has been determined by the Secretary of Agriculture, the Branch of Grazing establishes the year-long grazing fee to be charged for each class of stock. It also conducts investigations concerning the best use of the forage resources of the national forests.

**Grazing Studies.** *JAMES T. JARDINE, Inspector of Grazing, in charge.*

This office deals with investigations aimed to bring about more efficient utilization by live stock of the annual forage crop produced on ranges within the national forests. It is also directing the survey and type classification of range lands within the national forests.

**Branch of Lands.**

**E. A. SHERMAN, Assistant Forester in charge; C. H. SQUIRE, Inspector of Lands; W. J. MANGAN, Examiner.**

This branch has general supervision of all matters relating to the application of the public-land laws to the lands within the national forests, and the uses of national forest lands other than timber sales and grazing.

**Land Classification.** *JOHN D. JONES, in charge.*

Examination and classification of lands within the national forests to determine their value for forest purposes.

**Settlement.** *F. L. HARVEY, in charge.*

Administration of the forest homestead act of June 11, 1906.

**Boundaries and Entry Surveys.** *R. V. REYNOLDS, in charge.*

Revision of forest boundaries and general classification of lands within national forests as to their value for forest purposes. Survey of forest homesteads in the national forests under instructions issued by the surveyors general of the General Land Office.

**Claims and Occupancy.** *CHARLES H. SQUIRE, in charge.*

This office has general supervision of all work pertaining to the examination of, and reporting on, lands within the national forests title to which is sought under the public-land laws. Where the acquisition of title is opposed the office cooperates with the office of the Solicitor in procuring necessary evidence. The office also has general charge of all matters relating to the occupancy of national forest land for any purpose except grazing. This includes the granting of rights of way for railroads, irrigation projects, etc.

**Branch of Research.**

**EARLE H. CLAPP, Assistant Forester in charge.**

This branch has general supervision, either directly or through the district foresters, of forest investigations, protection studies, the silvicultural experiment stations, and the Forest Products Laboratory; investigations of wood, wood products, the lumber and

other wood-using industries, logging costs, mill and market studies, forest statistics, including the collection of statistics of the wood-using industries, general economic questions bearing on forestry, and forest administration.

**Forest Investigations.** RAPHAEL ZON, *Chief.*

The Office of Forest Investigations deals mainly with the scientific problems underlying the management of forests. It directs the work at the national forest experiment stations through the district foresters and investigates the factors controlling the distribution of forests and forest trees, the relation of forest to stream flow and climate, the conditions under which natural regeneration of cut-over, burned-over, or otherwise denuded areas takes place, and the species and methods adapted to use in artificial reforestation under varying site conditions. It also studies the requirements of important species as to climate, soil, moisture, and light. It identifies field specimens and studies the commercial and botanical range of trees. The office conducts investigations of farm woodlands and, in cooperation with the extension agents of the States, demonstrates the best methods of handling them with special reference to marketing the product and caring for the timber crop. The library of the Forest Service is connected with the office; it contains 18,200 books and pamphlets on forestry and allied subjects.

*Studies.*—W. N. Sparhawk, W. D. Sterrett, C. R. Tillotson, E. R. Hodson; A. F. Hawes and W. R. Mattoon (in cooperation with the States Relations Service); Willis N. Munro (in cooperation with the Bureau of Entomology).

*Forest distribution.*—W. H. Lamb, Miss G. E. Wharton.

*Forest measurements.*—

*Library.*—Miss H. E. Stockbridge.

*Compilation.*—Miss Elizabeth B. Leech.

**Forest Products Laboratory.** C. P. WINSLOW, *Director*; OVID M. BUTLER, *Assistant Director*; DON P. JOHNSTON, *Assistant District Forester*; H. D. TIEMANN, *Dry Kiln Specialist*; P. R. HICKS, *Engineer in Forest Products*; OSCAR M. WOLD, *Fiscal Agent*; E. P. ANCONA, *Administrative Assistant*, CHARLES P. JUCKEM, *Executive Clerk*.

A forest-products laboratory is maintained in cooperation with the University of Wisconsin, at Madison. The laboratory conducts the following classes of investigations in the properties and utilization of forest products: (1) Investigations to determine the properties of forest products; (2) studies of fundamental principles underlying the seasoning and kiln drying of wood, its preservative treatment, its use for the production of fiber products (pulp, paper, fiber board, etc.), and its use in the manufacture of alcohol, turpentine, rosin, tar, and other chemical products; (3) experimental work in cooperation with commercial operators to verify laboratory experiments on a commercial scale; (4) cooperation with individuals or companies to assist them in applying principles and processes of proved commercial value. The lines of work pursued include wood preservation, wood chemistry, timber tests, and wood technology.

*Commercial extension.*—Rolf Thelen (on detail, Washington office).

*Review of results.*—Chas. R. Thomas, in charge; Ray C. Tuttle.

*Engineering.*—F. E. Bonner, in charge; B. L. Nelson, J. B. Yule, H. T. Burgess.

*Derived products.*—L. F. Hawley, in charge; Ernest Bateman, Samuel A. Mahood, E. C. Sherrard, Howard N. Calderwood, H. H. Mayo, G. W. Blanco, D. E. Cable.

*Lumber studies.*—Henry J. Hegel, in charge; D. G. White, W. W. Morris.

*Pulp and paper.*—, in charge; H. E. Surface (on detail, Washington office), Sidney D. Wells, V. P. Edwards.

*Timber mechanics.*—J. A. Newlin, in charge; L. J. Markwardt, T. R. C. Wilson, J. S. Mathewson, J. O. Bixby, E. R. Maurer, J. D. Diehl, G. E. Heck, Armin Elmendorf, H. S. Grenoble, R. Crane, C. E. Dennis, R. P. A. Johnson, R. E. Luxford, C. A. Plaskett, H. J. Rosenthal, S. Schwartz, J. R. Watkins, L. A. Welo, R. M. Wirka, H. S. Frary, C. B. Norris.

*Boat design.*—Henry J. Hegel, in charge of laboratory tests; Don L. Quinn, in charge of field studies; L. R. Morris, J. B. Frear, H. M. Hale, A. F. McDuffie, L. P. Elliott.

*Timber physics.*—Frank J. Hallauer, in charge; A. Koehler, C. A. Kupfer, Eloise Gerry, M. E. Diemer, Gertrude Griffin, C. W. Gould, James D. Studley, M. C. Jensen, C. V. Sweet, Lawrence V. Teesdale, D. R. Brewster, J. L. Brownlee, Nils P. Eckbo.

*Wood preservation.*—Clyde H. Teesdale, in charge; Geo. M. Hunt, Matthew E. Dunlap, Shirley W. Allen, S. B. Henning, Alfred C. Lindauer, Frederick L. Browne, Samuel Butterman, T. R. Traux, R. A. Colgan, F. T. Anderson, C. K. Cooperider, Clarence Cope, J. D. MacLean.

*Propeller manufacture.*—A. L. Heim, in charge; Samuel Morrell, A. C. Knauss, Louis Seutter, E. F. Horn.

**Industrial Investigations.** H. S. BETTS, *in charge.*

This office studies the wood-using industries of various States, woods used in manufacture, and methods of disposing of mill waste; collects statistics on the price of lumber at the mill and at the principal distributing markets of the country; and studies specifications and grading rules. The office also secures statistics of importance to the experimental work of the service and studies the movements of lumber to and from the principal markets.

*Studies.*—J. T. Harris and Harry P. Burden.

*Uses of woods.*—W. D. Brush.

*Wood-waste exchange.*—R. K. Helphenstine, Jr.

*Statistics of forest products.*—Franklin H. Smith, Albert H. Pierson. Collaborator: A. B. Strong, Albany, N. Y.

**Branch of Engineering.**

O. C. MERRILL, *Chief Engineer in charge.*

This branch has general supervision of engineering matters, the administration of water-power uses, and preparation of road-development plans in connection with national forest administration, and cooperates with the other branches on plans, specifications, and technical details.

**Roads.** T. W. NORCROSS, *Assistant Chief Engineer in charge.*

General administration and field inspection of road work under the 10 per cent appropriation and section 8 of Federal Aid Road Act. Examination and coordination of road plans for the several States, approval of road maps, plans, and specifications, and preparation of cooperative agreements with local authorities.

**Water Power.** LYLE A. WHITSIT, *Assistant Engineer in charge.*

General administration and field inspection of water power and transmission line uses. Reports upon applications for easements affecting national forest lands. Examination of proposed alienations, eliminations, additions, and withdrawals where water power is involved.

**Forest Maps and Surveys.** FRANK E. BONNER, *Assistant Engineer in charge;* C. A. KOLB, *Geographer.*

General administration and field inspection of land, boundary, and other surveys. Establishment of standards in instruments and methods of survey. Supervision and field inspection of mapping and drafting, and maintenance of forest folios and map files.

**Acquisition of Lands under the Weeks Law.**

WM. L. HALL, *Assistant Forester;* W. W. ASHE, *Acting, in charge.*

This office designates the areas where lands are to be purchased, receives proposals, appraises lands, conducts tentative negotiations, prepares recommendations to the Secretary of Agriculture and the National Forest Reservation Commission, and makes surveys of lands to be acquired under the act of March 1, 1911, for the protection of the watersheds of navigable streams.

**Districts.**

*District 1.*—National forests in Montana, northern Idaho, northeastern Washington, and the northwest corner of South Dakota; headquarters at Missoula, Mont. R. H. Rutledge, acting district forester.

*District 2.*—National forests in Colorado, Nebraska, the greater part of South Dakota, eastern and central Wyoming, Minnesota, and Michigan; headquarters at Denver, Colo. Smith Riley, district forester.

*District 3.*—National forests in most of Arizona and all of New Mexico; headquarters at Albuquerque, N. Mex. Paul G. Redington, district forester.

*District 4.*—National forests in Utah, northwestern Arizona, most of Nevada, southern Idaho, and western Wyoming; headquarters at Ogden, Utah. L. F. Kneipp, district forester; A. H. Cousins, property assistant; J. G. Falck, property auditor.

*District 5.*—National forests in California and western Nevada; headquarters at San Francisco, Cal. Coert Du Bois, district forester; Roy Headley, acting district forester.

*District 6.*—National forests in Washington, Oregon, northwestern California, and Alaska; headquarters at Portland, Oreg. George H. Cecil, district forester.

*District 7.*—National forests and purchase areas in Arkansas, Florida, Oklahoma, Porto Rico, South Carolina, Georgia, North Carolina, Tennessee, Virginia, West Virginia, Alabama, Maine, and New Hampshire; headquarters at Washington, D. C. F. W. Reed, acting district forester; H. O. Stabler, acting assistant district forester; Francis Kiefer, \* assistant district forester.

Within each district (except district 7) the Offices of Operation, Silviculture, Grazing, Products, Lands, and Engineering perform duties similar to those performed by the corresponding branches outside the districts. The assistant district foresters in charge of these offices in the several districts are as follows:

*Operation.*—(1) Glen A. Smith; (2) Fred. W. Morrell; (3) Ward Shepard; (4) Vernon Metcalfe; (5) Clarence Wiley; (6) C. H. Flory; (7) H. O. Stabler.

*Silviculture.*—(1) J. F. Preston; (2) C. M. Granger\*, M. W. Thompson; (3) H. H. Chapman; (4) C. B. Morse; (5) T. D. Woodbury; (6) Thornton T. Munger; (7) F. W. Reed.

*Grazing.*—(1) C. H. Adams; (2) John H. Hatton; (3) John Kerr; (4) Homer E. Fenn; (5) C. E. Rachford; (6) E. N. Kavanagh; F. W. Reed.

*Lands.*—(1) F. A. Fenn; (2) C. J. Stahl; (3) Frank C. W. Pooler; (4) C. N. Woods; (5) L. A. Barrett; (6) C. J. Buck; (7) F. W. Reed.

*Research.*—(4) C. F. Korstian.

*Engineering.*—(1) G. H. Lautz; (2) ——; (3) C. A. Long; (4) J. P. Martin; (5) F. H. Fowler; (6) P. H. Dater; (7) H. O. Stabler.

*Products.*—(5) Cary L. Hill; (6) H. B. Oakleaf, L. A. Nelson; (7) S. L. Wolfe.

#### BUREAU OF PLANT INDUSTRY.

*Physiologist and Pathologist and Chief of Bureau.*, WILLIAM A. TAYLOR; *Physiologist and Associate Chief of Bureau.*, KARL F. KELLERMAN; *Chief Clerk.*, JAMES E. JONES; *Officer in charge of Publications.*, J. E. ROCKWELL; *Officer in charge of Records.*, W. P. COX.

The Bureau of Plant Industry studies plant life in all its relations to agriculture. The scientific work of the bureau is divided into 31 distinct groups, over each of which is placed a scientifically trained officer, who reports directly to the chief and assistant chief of the bureau. The work of the bureau is conducted on the project plan, the investigations under each of the officers being arranged by group projects consisting of closely related lines of work. These group projects are further divided into subprojects.

**Laboratory of Plant Pathology.** ERWIN F. SMITH, *Pathologist in charge.*

This is the central working laboratory for all of the pathological investigations conducted by the bureau. Studies of the diseases of a wide variety of crop plants are made in the laboratory and supplemented by field investigations and experimentation.

*Scientific staff.*—R. E. B. McKenney, pathologist; Frederick V. Rand, Florence Hedges, Nellie A. Brown, and Lucia McCulloch, Mary K. Bryan, Charlotte Elliott, Helen E. Fox, assistant pathologists; Harry Braun and Lillian C. Cash, scientific assistants; Agnes J. Quirk, laboratory aid; James F. Brewer, artist.

**Plant-Disease Survey.** GEORGE R. LYMAN, *Pathologist in charge.*

This office records the geographical distribution, annual prevalence, and rate of spread of diseases of economic plants in the United States, and estimates the amount of loss occasioned by them; studies epidemics and unusual outbreaks of disease in relation to various environmental factors; gathers data on the resistance and susceptibility of varieties to disease, practical effectiveness of various control methods, and other points of value in disease control work. All data collected is issued in the form of reports and bulletins. The office maintains close cooperative relations with pathologists and agriculturists generally.

*Scientific staff.*—Royal J. Haskell and J. H. Muncie, pathological inspectors; G. Hamilton Martin, jr., plant pathologist.

**Pathological Collections.** FLORA W. PATTERSON, *Mycologist in charge.*

This office maintains economic collections of pathological and related material; identifies edible and poisonous fungi; studies problems in entomogenous fungi; conducts taxonomic work in cooperation with various offices of the bureau; and makes miscellaneous identifications. In addition to securing new species of pathological fungi and systematically inserting them where they may be readily available for study, card indexes are maintained which refer to descriptions of fungi or relate to mycological or pathological subjects.

*Scientific staff.*—Vera K. Charles, assistant mycologist; Anna E. Jenkins, scientific assistant; Wm. W. Diehl, scientific assistant; Edith K. Cash, botanical translator.

**Fruit-Disease Investigations.** MERTON B. WAITE, *Pathologist in charge.*

These studies deal with diseases of fruits and fruit trees and methods of controlling or preventing them. They cover deciduous orchard fruits, citrus fruits, small fruits, and the cultivated nuts. Field demonstrations of new methods of disease control form an important part of the work. Investigations of decay and spoilage of fruits in transit, storage, and on the market are included. Pathological inspection of fruits during marketing is carried on in cooperation with the Bureau of Markets.

*Scientific staff.*—C. L. Shear, Charles Brooks, H. R. Fulton, John W. Roberts, W. B. Ballard, Neil E. Stevens, O. F. Burger, and D. H. Rose, pathologists; D. F. Fisher, J. S. Cooley, J. R. Winston, S. M. McMurran, and Clara H. Hasse, assistant-pathologists; H. F. Bergman, John G. Hall, Harold E. Turley, J. B. Demaree, H. A. Lee, R. B. Wilcox, L. M. Hutchins,\* E. A. Siegler, H. W. Truesdell, B. A. Rudolph,\* Angie M. Beckwith, Leva B. Walker, scientific assistants; Leslie Pierce, assistant in spraying experiments; R. B. Piper, and John J. Bowman, field and laboratory aids; J. M. Shull, botanical artist.

**Eradication of Citrus Canker.** Directed by Associate Chief of Bureau.

In cooperation with the Southern States in which citrus fruits are grown work is being conducted for the purpose of eradicating citrus canker, by the thorough inspection of nurseries and citrus groves, formalin treatment of infected soil, protective spraying of groves exposed to infection, and destruction of diseased trees. The following-named State officials are in local charge of the cooperative campaigns in their respective States, and approximately 625 agents are engaged in the work: Wilmon Newell, State plant commissioner, Florida; G. C. Starcher, State horticulturist, Alabama; W. E. Anderson, Louisiana; R. W. Harned, State entomologist, Mississippi; Neill D. Zuber, plant pathologist for Texas, State Department of Agriculture, Texas.

**Investigations in Forest Pathology.** HAVEN METCALF, *Pathologist in charge.*

This office studies various diseases affecting forest trees and timber, as well as ornamental and shade trees. The work is conducted in close cooperation with the Forest Service.

*Scientific staff.*—Carl Hartley, George G. Hedgecock, C. J. Humphrey, Nathaniel O. Howard, W. H. Long, E. P. Meinecke, Perley Spaulding, pathologists; Alonzo B. Brooks, J. Franklin Collins, Samuel B. Detwiler, Richard M. Marble, James F. Martin, Roy G. Pierce, Walter H. Snell, James R. Weir, forest pathologists; John S. Boyce, Reginald H. Colley, George F. Gravatt, N. Rex Hunt, assistant pathologists; Ellsworth Bethel, pathologist in forest-tree rust investigations; Mrs. Rose H. Lichtenwalter, Miss Annie E. Rathbun, Arthur S. Rhoads, Miss C. Audrey Richards, Miss Minnie W. Taylor, Miss Alma M. Waterman, assistants in forest pathology; Rush P. Marshall, pathological inspector; Edmund C. Filler, Walter O. Frost, William S. Moir, George A. Root, Ralph A. Sheals, assistants in white-pine blister-rust control; Glenn G. Hahn, Ernest E. Hubert, Gilbert B. Posey, Paul V. Siggers, Richard A. Stuhalter, scientific assistants.

**Cotton, Truck, and Forage Crop Disease Investigations.** W. A. ORTON, *Pathologist in charge.*

These investigations cover diseases of garden vegetables, including field demonstration of methods of control and prevention; diseases of cotton, of cowpeas and other forage crops, and of related plants.

*Scientific staff.*—L. P. Byars, H. A. Edson, C. T. Gregory, W. W. Gilbert, L. L. Harter, I. C. Jagger, Fred R. Jones, L. O. Kunkel, George K. K. Link, L. M. Massey, and E. S. Schultz, pathologists; F. J. Pritchard, physiologist; L. O. Watson, pathological adviser; Ruth F. Allen, Wilber Brotherton, Jr., R. O. Cromwell, E. D. Eddy, M. R. Ensign, W. S. Fields, J. P. Benson, J. I. Lauritzen, H. G. MacMillan, Fred C. Meier, A. J. Mix, J. Rosenbaum, M. Shapovalov, J. L. Weimer, D. G. Milbrath, J. P. Bennett, A. H. Gilbert, R. A. Jehle, and D. C. Neal, assistant pathologists; W. B. Clark, biochemist; William N. Ankeney, Ruth Colvin, W. L. Doran, M. W. Gardner, G. A. Meckstroth, W. S. Porte, G. B. Ramsey, E. C. Sherwood, and J. C. Walker, scientific assistants; E. T. Bartholomew, J. W. Blachly, S. L. Dodd, Jr., J. M. Le Cato, J. L. Seal, H. B. Tisdale, and A. L. Wilson, agents; W. H. Burkholder and B. L. Richards, collaborators; L. E. Barrett, Hallie Marvin, Paul R. McCrery, Margaret Guest, and George C. Broadbent, field and laboratory aids.

**Crop Physiology and Breeding Investigations.** WALTER T. SWINGLE, *Physiologist in charge.*

This office investigates the physiology of crop plants with a view to determining the limiting factors which control their successful culture and the breeding and testing of new varieties. Several field stations are maintained. Field investigations are con-

\*At present in the military service.

ducted on some of the Indian reservations of the Southwest for testing crop plants which seem likely to be suited for culture by the Indians and by white settlers in adjoining regions. Dates, Smyrna figs, hardy citrus fruits, pistaches, and certain drought-resistant tree crops are being tested.

*Scientific staff.*—T. Ralph Robinson, physiologist; S. C. Mason, arboriculturist; G. P. Rixford, physiologist; Maude K. Swingle, botanical assistant; E. M. Savage, assistant plant breeder; Bruce Drummond, assistant; Tyozaburo Tanaka, botanical translator; Esten W. Campbell, A. R. Leding, and Edgar A. Palmer, agents.

**Soil Bacteriology Investigations.** Directed by Associate Chief of Bureau.

This work is a study of the relation of bacteria to soil fertility, plant growth, cellulose destruction, and the fixation of nitrogen. Pure cultures of nodule-forming bacteria for leguminous crops are distributed.

*Scientific staff.*—Felix Löhnis, soil biologist; F. M. Scales, assistant soil mycologist; Alfred P. Dachnowski, physiologist; F. L. Goll and Lewis T. Leonard, assistant physiologists; N. R. Smith,\* scientific assistant; Franklin W. Marsh, junior chemist; Miss Cora Guest, laboratory aid.

**Soil Fertility Investigations.** OSWALD SCHREINER, *Biochemist in charge.*

This office studies the causes of and remedy for infertility in certain soils, whether natural or arising from improper methods of cultivation and cropping. It separates, identifies, and studies certain organic substances found in unproductive soils, and corrects their evil effects by mechanical handling, by the use of fertilizers, and by other methods available to the farmer. It makes a study of the action of fertilizers on field crops.

*Scientific staff.*—Bailey E. Brown, Joshua J. Skinner, Lewis A. Hurst, Louis J. Gillespie, biochemists; Fred R. Reid, Ralph B. Deemer, Rolla N. Harger, and Alfred W. Francis, assistant biochemists; Henry Winckelmann, scientific assistant; Albert M. Jackson, laboratory aid.

**Crop Acclimatization and Adaptation Investigations.** O. F. COOK, *Botanist in charge.*

These investigations have special reference to the acclimatization in the South and Southwest of Central American varieties of cotton, corn, and other tropical crop plants. The breeding of cottons for the boll-weevil territory is a special feature.

*Scientific staff.*—G. N. Collins and H. Pittier, botanists; D. A. Saunders, plant breeder; C. B. Doyle, assistant botanist; W. W. Ballard, W. B. Camp, G. B. Gilbert, J. H. Kempton, H. F. Loomis, C. G. Marshall, R. D. Martin, G. S. Meloy, D. M. Simpson, H. M. Steece, and C. K. Wildermuth, assistants in crop acclimatization; S. H. Hastings, farm superintendent; O. W. Barrett and D. W. Frear, agriculturists.

**Fiber-Plant Investigations.** L. H. DEWEY, *Botanist in charge.*

These investigations deal with the study of fiber plants likely to prove of value in the United States and the encouragement of fiber-plant industries.

*Scientific staff.*—H. T. Edwards, specialist in fiber-plant production; Robert L. Davis, scientific assistant; Rafael Vidal and A. H. Wright, agents.

**Drug, Poisonous, and Oil Plant Investigations.** W. W. STOCKBERGER, *Physiologist in charge.*

These investigations, which include both field and technical laboratory studies, deal with the commercial culture and production of drug, oil-seed, volatile-oil, and related crops; possibilities in utilization of pits, culls, and similar waste materials of the canning and fruit-packing industries as sources of oils and other valuable products; improvement of active-principle content of drug plants; properties and geographic distribution of poisonous plants.

*Scientific staff.*—James H. Shrader, chemical technologist; Frank Rabak and A. F. Sievers, chemical biologists; W. W. Eggleston, assistant botanist; G. Archie Russell, expert; Thos. B. Young, assistant agronomist; N. R. Mueller, James Thompson, and E. C. Young, scientific assistants.

**Plant Physiological and Fermentation Investigations.** RODNEY H. TRUE, *Physiologist in charge.*

This office studies the fundamental physiological requirements of plants; the physiology of germination; the nature of changes in constituents and in structure produced in plants by injury, disease, action of parasites, storage processes, etc.; the metabolism of molds and parasitic plant organisms; the function and significance of enzymes in plants; and factors underlying immunity to disease.

\*At present in the military service.

*Scientific staff.*—William Crocker and Heinrich Hasselbring, physiologists; Otis F. Black, chemical biologist; S. L. Jodidi, organic chemist; R. B. Harvey, assistant pharmacognosist; Fred W. Geise, scientific assistant; and James W. Kelly, laboratory technician.

**Cereal Investigations.** CARLETON R. BALL, *Cercalist in charge.*

This work deals with the culture, adaptation, improvement, and uses of cereal crops, the prevention of diseases affecting cereals, the cultivation and breeding of flax for seed purposes, including a study of flax diseases, and the production and improvement of broomcorn.

*Scientific staff.*—L. C. Aicher, Chas. E. Chambliss, H. V. Harlan, C. E. Leighty, and C. W. Warburton, agronomists; C. H. Clark, J. Mitchell Jenkins, Jenkin W. Jones, and F. A. Kiene, assistant agronomists; John B. Seigliner,\* assistant agriculturist; Merritt N. Pope, assistant in barley investigations; James A. Faris, James R. Holbert, Harry B. Humphrey, A. G. Johnson, Chas. E. Owens, Geo. M. Reed, E. C. Stakman, Albert F. Thiel, and Miss Elda R. Walker, pathologists; J. G. Dickson, Chas. W. Hungerford, Alden A. Potter, Chas. S. Reddy, Miss Florence S. Willey, and Geo. L. Zundel, assistant pathologists; D. E. Stephens, and J. F. Ross, farm superintendents; Aaron F. Bracken, John C. Brinsmade, jr., J. Allen Clark, F. A. Coffman,\* Miss Maud Dawson, Victor H. Florell, J. H. Martin, B. E. Rothgeb, F. J. Schneiderhan,\* Miss Edith K. Seymour, Ralph W. Smith, T. R. Stanton, Theodore E. Stoa, and Miss Grace Wineland, scientific assistants; L. C. Burnett, Ralph H. Carr, Wm. T. Craig, Gardner M. Garren, Godfrey R. Hoerner, Geo. N. Hoffer, W. W. Mackie, Edwin B. Mains, M. A. McCall, and Allen G. Newhall, agents.

**Corn Investigations.** C. P. HARTLEY, *Physiologist in charge.*

These investigations are planned to determine the fundamental principles of corn improvement, adaptation, culture, and use that influence the quantity, quality, and profitableness of corn production. They are conducted on the farms of interested corn growers throughout the United States, and the facts determined support the educational work with corn as conducted by corn clubs and demonstration agents.

*Scientific staff.*—Ernest B. Brown, physiologist; Curtis H. Kyle, assistant physiologist; J. F. Free,\* and L. S. Mayer, scientific assistants; J. M. Hammerley and H. S. Garrison, assistants.

**Tobacco and Plant Nutrition Investigations.** W. W. GARNER, *Physiologist in charge.*

The tobacco work has to do with the improvement of tobacco by hybridization and selection, the improvement of methods of growing and handling the crop, the combating of diseases, and the general study of the tobacco industry. Experiments and demonstrations in the growing of tobacco in rotation with farm crops are features of the work.

The plant-nutrition studies relate to some of the broad problems concerned in the growth and development of crop plants as affected by nutrition.

*Scientific staff.*—E. H. Mathewson and G. W. Harris, crop technologists; Otto Olson, E. G. Beinhart, D. E. Brown, W. M. Lunn, E. G. Moss, R. H. Milton, James P. Young, James O. Evans, J. E. McMurtrey, jr., and C. M. Slagg, assistants in tobacco investigations; H. A. Allard, physiologist; Charles W. Bacon, assistant physiologist; Charles L. Foubert, scientific assistant; Charles S. Ridgway, assistant in botanical laboratory work; James Johnson, Theo. C. McIlvaine, agents.

**Agricultural Technology.** N. A. COBB, *Technologist in charge.*

These investigations deal with the improvement of technological methods in crop production and with the technology of the products and studies of free-living and plant-infesting nematodes.

*Scientific staff.*—W. E. Chambers, technologist; Albert Mann, plant morphologist; Emil G. Arzberger, pathologist; M. L. Harrison, assistant in technology; C. B. Bate-man, assistant.

**Paper-Plant Investigations.** Directed by C. J. BRAND, *Chief Bureau of Markets.*

This work has to do with the testing of plants believed to be suitable for paper manufacture.

*Scientific staff.*—Jason L. Merrill, paper plant chemist.

**Biophysical Investigations.** LYMAN J. BRIGGS, *Biophysicist in charge.*

This office studies physical problems connected with the work of the Bureau of Plant Industry. Attention is chiefly directed at present to biophysical problems in dry-land

\* In military service, on furlough.

agriculture, the water requirements and nutrition of crop plants, the influence of the physical environment on crop growth, and investigations in electroculture.

*Scientific staff.*—C. A. Jensen, associate physicist; J. O. Belz, assistant physicist; C. J. King and J. Z. Richardson, assistants in water requirements; James F. Breazeale, associate biochemist; J. W. McLane and Julia R. Pearce, laboratory assistants; A. B. Campbell, mechanical assistant.

**Seed-Testing Laboratories.** *EDGAR BROWN, Botanist in charge.*

These laboratories are charged with the enforcement of the Seed Importation Act and also examine samples of commercial seeds for the presence of adulteration and conduct a general propaganda in the interest of pure seed for the farmer. The work is performed both in Washington, D. C., and at cooperative laboratories in the field.

*Scientific staff.*—F. H. Hillman and W. L. Goss, assistant botanists; George T. Harrington, Emma F. Surrine, Bertha C. Hite, Anna M. Lute, Helen H. Henry, Etta O. Gilbert, Grace M. Cole, Rachel E. Holmes, Emma S. Doyle, Mary A. Penne, Agnes J. Ryder, Macy L. Spracher, Leota Thürlmann, Edith C. Higgins, and Salome E. Comstock, scientific assistants.

**Forage-Crop Investigations.** *CHARLES V. PIPER, Agrostologist in charge.*

The forage-crop investigations include methods of production; development and dissemination of new valuable varieties; extension of forage crops into sections where they are adapted but are grown only to a limited extent; and cooperation in the introduction and extension of new crops.

*Scientific staff.*—R. A. Oakley, A. J. Pieters, H. N. Vinall, Lyman Carrier, and Samuel M. Tracy, agronomists; Roland McKee, assistant agrostologist; P. L. Ricker, assistant botanist; M. W. Evans, W. J. Morse, A. B. Cron, H. R. Cates,\* Samuel Garver, Robert E. Getty, L. W. Kephart,\* Leroy Moomaw,\* Harvey L. Westover, Hiram R. Reed, Albert Hansen,\* Charles E. Hill, and H. A. Schoth, scientific assistants.

**Alkali and Drought Resistant Plant Investigations.** *T. H. KEARNEY, Physiologist in charge.*

This office investigates the alkali resistance of crop plants; develops, by breeding and selection, strains of field crops which will be more resistant to drought than the varieties now obtainable; and studies the physiology of drought resistance. The work is conducted in close cooperation with other branches of the bureau concerned with the up-building of agriculture in the West and Southwest.

*Scientific staff.*—H. L. Shantz and A. C. Dillman, physiologists; Clyde F. Griswold, scientific assistant; Walton G. Wells, assistant.

**Economic and Systematic Botany.** *FREDERICK V. COVILLE, Botanist in charge.*

This office maintains economic collections of cultivated plants and makes systematic studies of grasses and other economic plants, compiles for publication information on native plants, tests wild and little-known plants, and experiments with a view to the improvement of the grazing areas on the public lands.

*Scientific staff.*—A. S. Hitchcock, systematic agrostologist; W. E. Safford, economic botanist; Sidney F. Blake, Ivar Tidstrom, and Edward S. Steele, assistant botanists; Agnes Chase, scientific assistant.

**Dry-Land Agriculture Investigations.** *E. C. CHILCOTT, Agriculturist in charge.*

This office studies proper cultural methods for the growing of crops in the semiarid regions of the West, especially in that portion known as the Great Plains area. The objects are to determine the best methods of soil preparation and crop rotation for the conservation of moisture and the maintenance of humus in the soil.

*Scientific staff.*—J. S. Cole, agriculturist; J. M. Stephens, O. J. Grace, F. L. Kelso, J. E. Mundell, and E. F. Chilcott, farm superintendents; P. V. Cardon, assistant agronomist; C. B. Brown, A. L. Hallsted, L. N. Jensen, Joseph B. Kuska, Fay A. Wagner, W. P. Baird, H. J. Clemmer, O. R. Mathews, W. M. Osborn, M. Pfaender, J. T. Sarvis, J. C. Thysell, Leroy D. Willey, and Arthur E. Seamans, assistants; L. L. Zook, physiologist; G. W. Morgan, scientific assistant; Charles H. Ruzika and O. A. Thompson, agents; Francis E. Cobb and N. O. Henchel, assistants in dry-land agriculture.

**Western Irrigation Agriculture.** *C. S. SCOFIELD, Agriculturist in charge.*

The work is concerned with the development of profitable agriculture on the lands to be placed under irrigation in the western United States, and also with the testing of various crops suited for growth under irrigation. The work is conducted in cooperation with a number of the investigational offices of the bureau.

\* In military service, on furlough.

*Scientific staff.*—F. B. Headley, assistant agriculturist; Beyer Aune, R. E. Blair, Dan Hansen, H. K. Dean, James A. Holden, and C. R. Letteer, farm superintendents; Dorothy Mahan and A. A. Bryan, scientific assistants; C. E. Peterson, assistant in dry-land arboriculture.

**Sugar-Plant Investigations.** C. O. TOWNSEND, *Pathologist in charge.*

This office investigates all factors bearing upon the production and improvement of sugar plants, including a study of cultural methods, diseases, and the importation, selection, and breeding of varieties, as well as the proper handling and utilization of the raw material and of the by-products. It also studies the relation of the sugar crops, beet, cane, and sweet sorghum, to all other activities on the farm, including crop rotation, stock raising, labor, markets, etc., so far as these factors have any bearing upon the production and utilization of sugar plants and their by-products and upon the yield and quality of the finished products, sugar and syrup.

*Scientific staff.*—William H. Burns and E. C. Rittue, assistants; Caroline Rumbold, pathologist; Mrs. Eleanor H. Batson and Eubanks Carsner, assistant pathologists; James W. Jones, agriculturist; Louis L. Corbett, Samuel B. Nuckols, and William J. Uckle, assistant agriculturists; E. G. Titus, W. W. Tracy, Jr., and P. A. Yoder, technologists; F. S. Earle, specialist in sugar-cane culture; H. B. Cowgill, agronomist and plant breeder; Gerald Thorne, scientific assistant; S. F. Sherwood, assistant chemist; May Isaacson, field and laboratory aid; M. W. Hensel and R. L. Stewart, agents.

**Horticultural and Pomological Investigations.** L. C. CORBETT, *Horticulturist in charge.*

These investigations have to do with the improvement of methods of producing, shipping, and storing perishable fruits, truck, and related crops; landscape and vegetable gardening; floriculture and related subjects. The work is divided into fruit production, fruit utilization, viticulture, nut culture, pomological breeding, fruit history, fruit nomenclature and identification, truck-crop production, vegetable breeding, landscape gardening, floriculture and miscellaneous horticultural investigations, potato investigations, fruit and vegetable transportation, and storage investigations in cooperation with the Bureau of Markets.

*Scientific staff.*—C. P. Close, H. P. Gould, George C. Husmann, C. F. Kinman, E. R. Lake, and Leo B. Scott, pomologists; J. S. Caldwell, Lon A. Hawkins, C. A. Magoon, A. D. Shamel, and Walter Van Fleet, physiologists; C. W. Culpepper, Henry R. Kraybill, assistant physiologists; Charles E. Sando, junior chemist (biological); W. R. Beattie, W. C. Edmundson, D. N. Shoemaker, William Stuart, F. L. Mulford, horticulturists; J. H. Beattie, and Charles T. Dearing, assistant horticulturists; David Griffiths, agriculturist; W. F. Wight, botanist; C. H. Farr, microscopist; Charles F. Clark, assistant agronomist; W. W. Tracy, Sr., superintendent of testing gardens; C. A. Reed, nut culturist; R. M. Adams, Lois M. Cleney, Margaret Connor, George W. Dewey, C. L. Dyer, P. M. Lombard, Magdalene R. Newman, Elmer Snyder, and R. P. West, scientific assistants; F. L. Husmann, viticultural superintendent; Guy E. Yerkes, vineyard superintendent; J. L. Pelham, horticultural superintendent; Justin F. Fernald, mechanical assistant.

**Experimental Gardens and Grounds.** E. M. BYRNES, *Assistant in charge.*

This office is charged with the care and ornamentation of the department grounds, the maintenance of greenhouses and plant collections, and the propagation of plants for experimental and other purposes. Experimental work with florists' crops is also being conducted in the greenhouses.

**Congressional Seed Distribution.**

This work consists of the securing, packeting, and mailing of the quantities of vegetable, flower, and other seeds and plants necessary for congressional distribution, as well as the testing, propagation, and distribution of improved seeds of various crops.

*Staff.*—R. A. Oakley, agronomist in charge; Oliver F. Jones, executive assistant; J. E. W. Tracy, superintendent of seed distribution.

**Foreign Seed and Plant Introduction.** DAVID FAIRCHILD, *Agricultural Explorer in charge.*

This office secures promising new seeds and plants, both by agricultural exploration and by correspondence, and these are tested at the plant introduction field stations or through cooperation with other offices, experiment stations, experimenters, and private individuals. Investigations in plant propagation and in the development of certain plant industries are features of the work.

*Scientific staff.*—P. H. Dorsett, plant introducer in charge of plant-introduction field stations; Beverly T. Galloway, plant pathologist in charge of plant protection and

propagation; Peter Bisset, plant introducer in charge of foreign plant distributions; Wilson Popenoe and J. B. Norton, agricultural explorers; H. C. Skeels, G. P. Van Eseltine, and R. A. Young, botanical assistants; D. A. Bisset, Miss Bessie M. Broadbent, E. L. Crandall, L. G. Hoover, J. Harry Johnson, R. N. Jones, E. O. Orpet, P. G. Russell, and Henry N. Veen, assistants in plant introduction; Edward Goucher, plant propagator; R. L. Beagles, farm superintendent, in charge of plant-introduction field station, Chico, Cal.; Edward Simmonds, garden and field-station superintendent, in charge of plant-introduction field station, Miami, Fla.; J. E. Morrow, farm superintendent, in charge of plant-introduction field station, Rockville, Md.; David A. Bisset, assistant, in charge of plant-introduction field station, Brooksville, Fla.; and Henry E. Juenemann, farm superintendent, in charge of plant introduction field station, Bellingham, Wash.

**Arlington Experimental Farm.** Directed by L. C. CORBETT, *Horticulturist*.

The Arlington farm is the field laboratory at Washington for the Bureau of Plant Industry, as well as for other bureaus of the department. Widely varying field tests are conducted on the farm.

*Staff*.—E. C. Butterfield, assistant horticulturist in general charge; J. H. Criswell, assistant superintendent.

**Demonstrations on Reclamation Projects.** R. E. BLAIR, *Agriculturist in charge*.

This office conducts demonstration work with individual farmers and farmers' organizations on the Government reclamation projects, for the purpose of assisting in the establishment of specific agricultural industries suited to the conditions on these projects.

*Scientific staff*.—L. E. Cline, Roy P. Bean, Don G. Magruder, George O. Unruh, Edward H. Aicher, R. W. Allen, and Harry A. Lindgren, agriculturists.

**BUREAU OF CHEMISTRY.**

[Those whose names are starred(\*) are on furlough for military service.]

*Chief*, CARL L. ALSBERG; *Assistant Chief*, W. G. CAMPBELL; *Chief Clerk*, S. A. POSTLE.

The Bureau of Chemistry is concerned primarily with questions of agricultural chemistry of public interest, the enforcement of the food and drugs act, analytical work, and investigations under the food and drugs act, and other chemical investigations referred to it by the various branches of the Government service.

*Detailed to chief*.—V. Birckner, M. Boyle, J. F. Brewster, E. D. Clark, P. B. Clark, W. F. Clarke, W. D. Collins, C. W. Crawford, H. D. Davi, D. B. Dill, P. B. Dunbar, F. B. La Forge, B. McClelland, G. H. Mains,\* W. E. Mathewson, J. C. Munch,\* T. F. Pappe, H. E. Patten,\* H. Runkel, A. F. Taylor, and E. T. Wherry.

**General Administration.** A. E. DRAPER, *librarian*; K. A. SMITH, *editor*; F. B. LINTON, *administrative assistant*.

**Office of Cooperation.** J. S. ABBOTT, *Chemist in charge*.

This office endeavors to promote close and cordial cooperation between municipal, State, and Federal officials charged with the enforcement of all food and drug laws, works out policies for such cooperation, and seeks to unify and harmonize the work and policies of such officials.

*Assistant*.—W. C. Burnet.

**Drug Administration.** M. W. GLOVER, *Surgeon, Public Health Service, in charge*.

This office has to do with the preparation of cases dealing with violation of the provisions of the Food and Drugs Act relating to drugs.

*Assistants*.—A. P. Chadbourne, M. Cooley, A. J. McIntyre, A. S. Mitchell, F. P. Morgan,\* and A. G. Murray.

**Animal Physiological Chemical Laboratory.** F. C. WEBER, *Chemist in charge*.

The work in this laboratory includes a complete study of the application of chemical methods to the determination of deterioration of animal foods; investigations in the canning of marine products; salting, drying, and smoking of fish; and experimental work to improve the methods of analysis ordinarily employed in physiological chemistry.

*Scientific staff*.—J. B. Wilson, assistant.

**Carbohydrate Laboratory.** C. S. HUDSON, *Chemist in charge*.

This laboratory analyzes sugars, sirups, molasses, honeys, jellies, jams, preserves, infant foods, confectionery, and similar substances in connection with the enforcement of the food and drugs act. Analyses are also made of samples of sugars, starches, sirups, and molasses bought by the General Supply Committee. The laboratory investi-

gates the manufacturing processes used in the production of raw and refined sugar and molasses, maple sugar, sirups from cane, maple, and sorghum, and confectionery. Improved methods of chemical analysis are studied, and also the characteristic constants by which pure carbohydrates are distinguished.

*Scientific staff.*—J. K. Dale, O. S. Keener, K. P. Monroe, and C. F. Walton, jr., assistants.

**Color Investigation Laboratory.** H. D. GIBBS, *Chemist in charge.*

The various projects on the study of color substances which have been in progress in this bureau for some time are concentrated in this laboratory, and the investigations have been extended with a view to the prosecution of research of value to the American industries.

*Scientific staff.*—E. Q. Adams, J. A. Ambler, C. Conover, W. J. Cotton, H. G. Haller, L. A. Milseka, G. A. Oberhelman,\* Max Phillips, C. E. Senseman, L. E. Wise, and R. C. Young, assistants.

**Dehydration Division.** S. C. PRESCOTT, *Major, Surgcon General's Office, in charge.*

This division makes investigations and cooperates with individuals, firms, or corporations owning or operating plants for drying or dehydration of vegetables, fruits, and other perishable edible products, in order to determine the best means and processes of dehydration, and to disseminate information as to the value and suitability of these products for food.

*Assistant.*—L. D. Sweet.

**Drug Division.** L. F. KEBLER, *Chief.*

This division studies the properties, composition, and quality of drugs and medicinal preparations, and analyzes samples of such products purchased on the market. It also studies methods which may lead to more satisfactory analytical processes, especially for testing potent plant drugs and products derived from them. Toxicological investigations are made here. It cooperates with the Post Office Department in ridding the mails of fraudulent medical and other allied schemes. The chemical reagents purchased by the Bureau are tested by this division.

*Scientific staff.*—D. H. Brauns, H. E. Buc, W. O. Emery, D. H. Grant, W. H. Heath, W. F. Hunke, E. K. Nelson, S. Palkin, and C. D. Wright, assistants.

**Food Control Laboratory.** I. K. PHELPS, *Chemist in charge.*

The food control laboratory supervises the chemical examination of food products (not including cattle feeds) under the food and drugs act. This work includes the critical examination of reports and methods, food analysis, and the investigation of questions arising under the food and drugs act as they relate to these products. Special studies are also made of the manufacture and production of food products, the analysis of dairy products, the analysis of flour, the bleaching of flour, the analysis of some fermented food products, and the identification of some of the products of fermentation in such food products.

*Scientific staff.*—R. T. Balch, Pearl A. Bernhardt, O. L. Evenson, L. W. Ferris, M. J. Ingle, B. R. Jacobs, J. T. Keister, Lottie M. Manross, Marie L. Offutt, H. S. Paine, H. E. Palmer, J. I. Palmore, O. S. Rask, D. D. Reavis, jr.,\* Dorothy B. Scott, E. E. Smith, and E. L. P. Treuthardt,\* assistants.

**Food Investigation Laboratory.** R. W. BALCOM, *Acting Chemist in charge.*

This laboratory conducts investigations that are necessary as a basis for the regulatory work in food control. At the present moment the following problems are under investigation: The composition of commercial generator vinegar and the changes taking place in the conversion of cider into vinegar; some essential oils and synthetic flavors and flavoring extracts prepared therefrom; gelatin.

*Scientific staff.*—H. W. Houghton, H. A. Lepper, and C. R. Smith, assistants.

**Fruit and Vegetable Utilization Laboratory.** H. C. GORE, *Chemist in charge.*

This laboratory is investigating the utilization of surplus and cull fruits and vegetables. At present the drying of vegetables and fruits and the utilization of potatoes and sweet potatoes are receiving the most attention. Much of this work is in cooperation with the Bureau of Plant Industry. This laboratory has cooperated also with the Quartermaster Corps and with the Sanitary Corps in the drying of vegetables.

*Scientific staff.*—W. A. Boyle.

**Grain Dust Explosion Investigations.** D. J. PRICE, *Engineer in charge.*

Investigations are made of the causes of plant-dust explosions and fires in thrashers, mills, elevators, cotton gins, and storage warehouses, to determine the most effective means of preventing such explosions and fires. The work, which includes a campaign conducted among the mills and elevators to interest the owners and employees in a more

thorough protection of their property, is done in cooperation with the U. S. Food Administration, the Bureau of Public Roads, the Bureau of Markets, the Bureau of Plant Industry, Bureau of Mines in the Department of the Interior, and The Pennsylvania State College.

*Scientific staff.*—J. W. Bonham, P. E. Brady, H. H. Brown, H. R. Brown, G. W. Crawford, B. W. Dedrick, H. P. Dixey, V. Fitzimons, G. A. Hibbard, W. A. Noel, J. O. Reed,\* H. E. Roethe, F. H. Stone, J. P. Waters, and G. D. Witmer, assistants.

**Leather and Paper Laboratory.** F. P. VEITCH, *Chemist in charge.*

This laboratory conducts investigations of tannins and tanning materials, their effects upon the strength and properties of leather, and processes involved in their production; problems relating to the production of leather; the qualities of papers and their fitness for use in the Department of Agriculture and other departments of the Government which may request such investigations; the nature and uses of turpentine and resins, together with improved processes of production; the grading, weighing, and handling of naval stores, and preparation of definite type samples therefor; and the water and mildew proofing of fabrics and of leather. Turpentine and rosin are examined under the food and drugs act. Leathers, turpentine, resins, and textiles are examined for the departments of the Government requesting such work, and specifications are prepared for the purchase of these articles.

*Scientific staff.*—I. D. Clarke, R. W. Frey, V. E. Grotlisch, H. P. Holman, M. G. Hunt, Evelyn P. Ingalls, T. D. Jarrell, T. O. Kellems, B. S. Levine, and E. O. Reed, assistants.

**Microbiological Laboratory.** CHARLES THOM, *Mycologist in charge.*

This laboratory consists of a research section and a regulatory section and works upon the relation of molds and bacteria to food products. Its research projects cover studies of yeasts, oysters, sauerkraut, canned goods, deterioration of cereal products and of forage, classification and activities of bacteria and molds, and the development and standardization of methods applicable to biological inspection work. Its regulatory staff conducts the bacteriological inspection of milk, oysters, gelatin, table waters, tomato products, canned foods, and miscellaneous inspection samples in which spoilage is suspected.

*Scientific staff.*—M. B. Church, G. G. De Bord,\* Ruth B. Edmondson, A. C. Hunter, E. Lefevre, B. A. Linden, and H. W. Redfield, assistants.

**Microchemical Laboratory.** B. J. HOWARD, *Microscopist in charge.*

This laboratory makes microscopical and microchemical studies of foods, drugs, cattle feed, paper and textile materials, miscellaneous agricultural products, etc. It also makes microscopical examinations of insecticides, and studies methods for their microscopical identification and estimation. Special attention is given to the histological study of fruits, spices, cereals, starches, and other agricultural products for the purpose of perfecting methods for detecting the adulteration of these products.

*Scientific staff.*—G. L. Keenan, M. A. Lyons, W. K. Makemson, E. A. Read, B. H. Silberberg, and C. H. Stephenson, assistants.

**Miscellaneous Division.** J. K. HAYWOOD, *Chief.*

This division comprises the insecticide and fungicide laboratory, a cattle food and grain investigation laboratory, and a trade wastes laboratory, and studies insecticides and fungicides, cattle foods, forage crops, grains, trade wastes, and certain hygienic problems, making analyses under the food and drugs act and the insecticide act, and performing such miscellaneous chemical work as may be referred to it. This division makes cooperative investigations of insecticides and fungicides for the Bureau of Entomology and Bureau of Plant Industry, and is engaged, with the latter bureau, in a number of cooperative studies of grain and forage crops. Much time is given to the investigation of new methods of analysis of insecticidal and fungicidal materials and to chemical investigations of insecticides and fungicides.

*Scientific staff.*—Cattle food and grain investigation laboratory: G. L. Bidwell, chemist in charge; L. E. Bopst, M. R. Coe, J. B. Reed, and G. P. Walton, assistants. Insecticide and fungicide laboratory: C. C. McDonnell, chief; N. H. Borden, F. C. Cook, J. K. Dickerson, R. Elmer,\* J. J. T. Graham, B. E. Green,\* E. L. Griffin, W. E. Kuentzel,\* W. D. Lynch, L. N. Markovitz,\* W. J. Morgan, E. J. Nealon, A. C. Nothstine, L. P. Shippen, C. M. Smith, and C. B. Stone, assistants. Trade wastes laboratory: Under J. K. Haywood, chief.

**Nitrogen Laboratory.**

Nitrogen determination for all laboratories of this bureau, as well as for many of the other bureaus of the department, are made in the nitrogen laboratory. Work in cooperation with the Association of Official Agricultural Chemists is also done, looking to the improvement of the methods for making these determinations.

*Assistants.*—L. J. Jenkins and E. D. Stirlen.

**Oil, Fat, and Wax Laboratory.** G. S. JAMIESON, *Chemist in charge.*

This laboratory analyzes oils, fats, cooking compounds, chocolates, nut butters, and similar substances in connection with the enforcement of the food and drugs act. It studies the chemical composition of American food oils, fats, and hydrogenated compounds, and carries on investigations in the production of such products.

**Pharmacognosy Laboratory.** C. O. EWING, *Acting pharmacognosist in charge.*

This laboratory supervises the inspection of crude drugs under the food and drugs act. It investigates the chemical, histological, and morphological characteristics of drugs and plants. It works on the improving of methods of drug analysis and on the establishing of standards for drugs and other plant products.

*Scientific staff.*—J. F. Clevenger, M. G. Mastin,\* and E. S. Stanford, assistants.

**Pharmacological Laboratory.**

This laboratory makes researches on the physiological action of poisonous substances occurring in food products and of drugs used in medicine, and physiological tests of drugs to ascertain the strength and purity of medicinal preparations found in the open market.

*Scientific staff.*—E. W. Schwartz, assistant.

**Phytochemical Laboratory.** F. B. POWER, *Chemist in charge.*

The purpose of this laboratory is to subject plants and vegetable drugs to a complete chemical investigation, with special consideration of such constituents as may represent their physiological activity. It thus endeavors to ascertain the possible utilization of various plants or their active principles as therapeutic agents, and also facilitate the detection of drugs in such medicinal preparations or other products as are subject to surveillance under the food and drugs act.

*Scientific staff.*—V. K. Chesnut, assistant.

**Plant Chemical Laboratory.** J. A. LE CLERC, *Chemist in charge.*

The plant chemical laboratory studies the chemistry of plants, with respect especially to climate and environment, both in the greenhouse and in the field; changes taking place in grain during germination, malting, and storage; and milling and bread-making. Work is also done in collaboration with the Bureau of Plant Industry on problems connected with plant physiological chemistry.

*Scientific staff.*—L. H. Bailey, Ruth Buchanan, J. Davidson, C. D. Garby, P. L. Mann, O. A. Pettyjohn, and Clementine J. Prior, assistants.

**Protein Investigation Laboratory.** C. O. JOHNS, *Chemist in charge.*

This laboratory investigates and analyzes the proteins which occur in seeds and other vegetable substances used as foods. At present the proteins of the peanut, the velvet bean, coconut, buckwheat, and kafrir are under investigation. The purpose of these researches is to ascertain the nutritive value of the various proteins. Feeding experiments are conducted in cooperation with the Bureau of Animal Industry. Experimental work is also done to improve the methods used in the preparation and analysis of proteins.

*Scientific staff.*—A. J. Finks, C. E. F. Gersdorff, D. B. Jones, Mabel S. Paul, and H. C. Waterman, assistants.

**Water Laboratory.** W. W. SKINNER, *Chemist in charge.*

This laboratory studies the composition of waters, brines, salts, and nonalcoholic beverages, and analyzes samples of such products taken in the enforcement of the food and drugs act. It investigates sanitary and technical problems relating to the production of bottled waters, nonalcoholic beverages, and related products.

*Scientific staff.*—C. H. Badger,\* W. F. Baughman, Anna E. Mix, and J. W. Sale, assistants.

**Field Investigation Service.****Citrus By-Products Laboratory.** E. M. CHACE, *Chemist in charge.*

This laboratory directs its attention to devising methods for the utilization of cull oranges and lemons. With this in view, methods are being studied for the manufacture of citric acid, oils of lemon and of orange, concentrated orange juice, and orange vinegar. It conducts investigations relating to the maturity of fruits and vegetables.

*Scientific staff.*—C. G. Church and H. D. Poore, assistants.

**Food Research Laboratory.** M. E. PENNINGTON, *in charge.*

The food research laboratory makes chemical, bacteriological, and histological studies of foods preserved by low temperatures. Milk, poultry, eggs, and fish have been the objects of investigation, with reference to their decomposition and putridity during preparation, transportation, storage, and marketing, in connection with the food and drugs act. A special investigation of frozen and dried eggs and egg products has been

\* In military service, on furlough.

carried on, chiefly in the egg-breaking establishments, and with the cooperation of the industry; a similar investigation of fish, both fresh and frozen, is now being conducted.

*Scientific staff.*—L. H. Almy, J. C. Bailey, A. L. Becker<sup>2</sup>, J. M. Borders, H. C. Bowman, R. L. Cochran,<sup>1</sup> J. G. Evans, Elmer Field, L. E. Harker, E. C. Heinsohn, J. S. Hepburn, H. R. Hill, M. K. Jenkins, A. C. Klingman, E. F. Kohman,<sup>2</sup> H. A. McAleer, H. C. Pierce, H. A. Shonle,<sup>2</sup> C. E. Sidler, R. L. Skinner, and H. H. Steup,<sup>2</sup> assistants.

#### Field Regulatory Service.

##### Food and Drug Inspection.

The country has been divided into three food and drug inspection districts, Eastern, Central, and Western, each with a chief in charge, who has immediate supervision of the branch stations and the inspectors within his district. The eastern inspection district (B. R. Hart,<sup>1</sup> New York) includes the stations in Baltimore (A. L. Sullivan<sup>2</sup>), Boston (G. H. Adams<sup>2</sup>), Buffalo (L. Patton<sup>2</sup>), New York (A. F. Seeker<sup>2</sup>), Philadelphia (A. Stengel<sup>2</sup>), San Juan (W. J. McGee<sup>2</sup>), Savannah (—<sup>2</sup>). The central inspection district (R. E. Doolittle,<sup>1</sup> Chicago) includes the stations in Chicago (G. W. Hoover<sup>2</sup>), Cincinnati (L. B. Forst<sup>2</sup>), Minneapolis (H. H. Walters<sup>2</sup>), New Orleans (—<sup>2</sup>), and St. Louis (W. R. M. Wharton<sup>2</sup>). The western inspection district (R. W. Hiltz,<sup>1</sup> San Francisco) includes the stations in Denver (R. S. Hiltner<sup>2</sup>), San Francisco (—<sup>2</sup>), and Seattle (W. Vincent<sup>2</sup>). There is a corps of 51 food and drug inspectors in the field. This force is in charge of the field operations connected with the enforcement of the food and drugs act. Its duties include the collection and analyses of official samples of foods and drugs, the inspection of establishments manufacturing products subject to the act, and such other investigations as are necessary in connection with its enforcement. The preliminary steps in the development of prosecutions under the food and drugs act are taken by the field stations. The field laboratories also supervise importations of foods and drugs at the various ports. In addition to the regulatory work, the laboratories are called upon to examine many samples submitted by other branches of the Government service.

##### State Officials Collaborating in the Enforcement of the Food and Drugs Act.

*Alabama.*—M. C. Allgood, Commissioner of Agriculture and Industries, Montgomery. *Arizona.*—C. A. Bosworth, Director of State Laboratory, University of Arizona, Tucson. *Arkansas.*—C. U. Garrison, State Health Officer, Little Rock; J. H. Page, Commissioner of Mines, Manufactures, and Agriculture, Little Rock. *California.*—E. J. Lea, Director, Bureau of Foods and Drugs, State Board of Health, University of California, Berkeley. *Colorado.*—S. R. McKelvey, Food and Drug Commissioner, State Department of Health, Capitol Building, Denver. *Connecticut.*—Thomas Holt, Dairy and Food Commissioner, Capitol Building Hartford. *Delaware.*—C. H. Wells, State Board of Health, Wilmington. *District of Columbia.*—W. C. Fowler, Health Department, Washington; R. R. Ashworth, Chief Food Inspector, Washington; George M. Roberts, Department of Weights, Measures, and Markets, Washington. *Florida.*—W. A. McRae, Commissioner of Agriculture, Tallahassee. *Georgia.*—J. J. Brown, Commissioner of Agriculture, Atlanta. *Hawaii.*—M. B. Bairros, Deputy Food Commissioner, Honolulu. *Idaho.*—John K. White, Dairy, Food, and Sanitary Inspector, Boise. *Illinois.*—J. B. Newman, Superintendent of Foods and Dairies, Department of Agriculture, 1410 Kimball Building, Chicago. *Indiana.*—H. E. Barnard, State Board of Health, Statehouse, Indianapolis. *Iowa.*—W. B. Barney, Dairy and Food Commission, Des Moines. *Kansas.*—S. J. Crumbine, State Board of Health, Topeka; L. A. Fitz, State Agricultural College, Manhattan. *Kentucky.*—R. M. Allen, Agricultural Experiment Station, University of Kentucky, Lexington; J. D. Turner, Agricultural Experiment Station, Lexington. *Louisiana.*—Oscar Dowling, State Board of Health, New Orleans; Harry D. Wilson, Department of Agriculture and Immigration, Baton Rouge. *Maine.*—J. A. Roberts, Commissioner of Agriculture, Augusta. *Maryland.*—F. C. Bianck, State Department of Health, Baltimore. *Massachusetts.*—E. R. Kelley, Commissioner of Health, Boston; Philip H. Smith, Agricultural Experiment Station, Amherst. *Michigan.*—F. L. Woodworth, Dairy and Food Commissioner, Lansing; A. J. Patten, Agricultural Experiment Station, East Lansing. *Minnesota.*—J. Sorensen, Dairy and Food Commissioner, New Capitol, St. Paul. *Mississippi.*—W. F. Hand, Agricultural and Mechanical College, Agricultural College. *Missouri.*—E. L. Barnhouse, Food and Drug Commissioner, Merchants Bank Building, Jefferson City. *Montana.*—W. F. Cogswell, State Board of Health, Helena. *Nebraska.*—Otto Murschel, Food, Drug, Dairy, and Oil

\* On furlough, military service.

<sup>1</sup> Chief of district.

<sup>2</sup> Chief of station.

Commission, Lincoln. *Nevada*.—H. B. Bulmer, Food and Drug Commissioner, Reno. *New Hampshire*.—S. G. Morrell, State Board of Health, Concord. *New Jersey*.—R. B. Fitz-Randolph, Department of Health, Trenton; J. G. Lipman, Director of Agricultural Experiment Station, New Brunswick. *New York*.—C. S. Cathcart, Division of Agriculture, Department of Farms and Markets, Albany; E. H. Porter, Commissioner of Foods and Markets, Albany. *North Carolina*.—W. A. Graham, Commissioner of Agriculture, Raleigh. *North Dakota*.—Edwin F. Ladd, Food Commissioner, Agricultural College. *Ohio*.—T. F. Gault, Board of Agriculture, Dairy and Food Division, Columbus; J. S. Smith, Board of Agriculture, Columbus. *Oklahoma*.—John W. Duke, Department of Public Health, Guthrie; F. M. Gault, Board of Agriculture, Oklahoma City. *Oregon*.—J. D. Mickle, Dairy and Food Commission, 510 Worcester Building, Portland. *Pennsylvania*.—James Foust, Department of Agriculture, Harrisburg. *Porto Rico*.—A. R. Soler, Commissioner of Health, San Juan. *Rhode Island*.—F. A. Jackson, Room 21, Statehouse, Providence. *South Carolina*.—A. C. Summers, Commissioner of Agriculture, Commerce, and Industries, Columbia. *South Dakota*.—Guy G. Frary, Department of Food and Drugs, Vermillion. *Tennessee*.—H. L. Eskew, Department of Food and Drugs, Nashville; H. K. Bryson, Commissioner of Agriculture, Nashville. *Texas*.—R. H. Hoffman, jr., Food and Drug Department, Austin; B. Youngblood, Agricultural Experiment Station, College Station. *Utah*.—W. M. Boyden, Dairy and Food Commissioner, Salt Lake City. *Vermont*.—Charles F. Dalton, State Board of Health, 184 Church Street, Burlington. *Virginia*.—Benj. L. Purcell, Department of Agriculture and Immigration, Richmond. *Washington*.—E. F. Benson, Commissioner of Agriculture, Olympia. *West Virginia*.—S. L. Jepson, Commissioner of Health, Charleston. *Wisconsin*.—C. P. Norgord, Commissioner, Department of Agriculture, Madison; G. J. Weigle, Dairy and Food Commissioner, Madison. *Wyoming*.—Maurice Groshon, Deputy Dairy, Food, and Oil Commissioner, Cheyenne.

#### BUREAU OF SOILS.

*Soil Physicist and Chief of Bureau*, MILTON WHITNEY; *Chief Clerk*, A. G. RICE; *Chas. H. Seaton, Editor*.

The Bureau of Soils investigates the relation of soils to climate and organic life; studies the texture and composition of soils in field and laboratory; and maps and classifies the soils in selected areas in the different parts of the country.

The bureau prepares annually the report of the Field Operations of the Bureau of Soils, which contains a detailed description of the soils and of the agricultural conditions of the various areas surveyed, points out the present use of the soils, and discusses possible changes in crops and methods of cultivation. Large-scale lithographic maps showing the distribution of the different kinds of soils accompany each report.

The bureau investigates domestic fertilizer resources, and carries on work looking to improvement in the methods of fertilizer manufacture, and to the discovery of new materials or new combinations of materials for use in fertilizers.

**Soil Chemical Investigations.** WM. H. FRY, *Scientist in charge*.

Chemical laboratories are maintained for the investigation of the composition of soil types, the nature and occurrence of soil minerals, the composition of the soil solution, and the properties of soils in their relation to origin, texture, and productiveness. Routine chemical work in connection with the Soil Survey and other divisions of the bureau and other offices and bureaus of the department is also carried on.

*Scientific staff*.—H. P. Magnuson, J. G. Smith, and M. S. Anderson.

**Soil Physical Investigations.** R. O. E. DAVIS, *Scientist in charge*.

In the physical laboratories investigations of the properties of the soil are carried on and a study made of their economic bearing; the moisture relations, aeration, heat conductivity, texture, and other physical properties are investigated in their relation to soil productivity; mineralogical and mechanical analyses are made of soil types for the Soil Survey parties; and apparatus for field parties and for other divisions of the bureau is constructed and tested.

*Scientific staff*.—J. B. Kershaw, J. B. Spencer, L. B. Olmstead, and W. B. Page.

**Investigations of Fertilizer Resources.** FREDK. W. BROWN, *in charge*.

Investigations are made into the fertilizer resources of the United States with a view to discovering new sources of fertilizer materials and to utilizing for fertilizer many waste products; improvement in existing methods of manufacture and the study of new methods are carried out.

*Scientific staff.*—J. W. Bomboy, H. Bryan, W. C. Crandall, C. J. Crawley, W. H. Ross, W. O. Robinson, C. C. Fletcher, A. R. Merz, E. B. Smith, G. C. Spencer, T. B. Turley, J. W. Turrentine, W. H. Wagggaman, R. F. Gardiner, and W. B. Pope.

**Soil Survey Investigations.** CURTIS F. MARBUT, *Scientist in charge*; GEO. W. BAUMANN, *Executive Assistant*.

The work of the Soil Survey includes the study of the field characteristics of soils, the formulation of definitions and descriptions for individual soil types on the basis of their field characteristics, the identification of the various soil types thus defined, and the determination of their distribution, area, relationships, and agriculture in the United States. The work is carried on mainly by the detailed study of small unit areas such as counties and experiment-station farms, in many cases in cooperation with various State organizations.

*Scientific staff.*—Inspectors: Southern division, W. E. Hearn; Northern division, W. E. McLendon and T. D. Rice; Western division, M. H. Lapham. Soil specialists: J. A. Bonsteel and J. E. Lapham. Soil surveyors: J. H. Agee, A. C. Anderson, Miles W. Beck, H. H. Bennett, R. T. A. Burke, W. T. Carter, jr., W. B. Cobb, C. E. Deardorff, E. B. Deeter, J. E. Dunn, T. J. Dunnewald, W. S. Eckmann, Horace V. Geib, W. J. Geib, H. W. Hawker, Frank A. Hayes, F. Z. Hutton, G. B. Jones, R. C. Jurney, N. M. Kirk, A. E. Kocher, W. J. Latimer, H. G. Lewis, Clarence Lounsbury, E. T. Maxon, A. H. Meyer, H. C. Mortlock, A. M. O'Neal, jr., A. L. Patrick, S. O. Perkins, L. R. Schoenmann, E. H. Smies, H. C. Smith, Edmund H. Stevens, A. T. Strahorn, A. E. Taylor, W. E. Tharp, E. S. Vanatta, J. O. Veatch, W. I. Watkins, E. B. Watson, and R. A. Winston.

#### BUREAU OF ENTOMOLOGY.

*Entomologist and Chief of Bureau*, L. O. HOWARD; *Entomologist and Assistant Chief of Bureau*, C. L. MARLATT; *Administrative Assistant*, E. B. O'LEARY; *Chief Clerk and Executive Assistant*, A. J. LEISTER; *Editor*, ROLLA P. CURRIE; *Librarian*, MABEL COLCORD; *Entomologist in Extension Work*, J. A. HYSLOP.

The Bureau of Entomology studies insects with special reference to methods of control, experiments with the introduction of beneficial insects, makes tests with insecticides and insecticide machinery, and identifies insects sent in by inquirers. Field laboratories are located throughout the country.

**Southern Field-Crop Insect Investigations.** W. D. HUNTER, *Entomologist in charge*; W. D. PIERCE, *Entomologist, acting in charge*.

These investigations deal with insect pests of cotton, tobacco, sugar cane, castor bean, peanut, and rice, and are planned to reveal practical methods of control. Special attention is given to the Mexican cotton-boll weevil and its parasitic enemies. An investigation of the Argentine ant is included.

*Scientific staff.*—A. C. Morgan, entomologist; E. S. Tucker, cotton entomologist; T. E. Holloway, T. C. Barber, B. R. Coad, S. E. Crumb, E. A. McGregor, G. D. Smith, and J. D. Mitchell, entomological assistants; E. R. Barber, R. W. Moreland, F. S. Chamberlin, Max Kisliuk, jr., and T. F. McGehee, scientific assistants; T. P. Cassidy, G. L. Garrison, W. B. Williams, F. F. Bondy, H. W. Lee, M. T. Young, cotton entomologists.

**Cereal and Forage Insect Investigations.** W. R. WALTON, *Entomologist in charge*.

The clover and alfalfa seed chalcis-fly, wireworms, the corn leaf-aphis and the corn root-aphis, the alfalfa weevil, the fall army worm, the Hessian fly, the alfalfa gall midge, the southern corn rootworm, false wireworms, the alfalfa caterpillar, the chinch bug, white grubs, the western army cutworm, jointworms, the European corn borer, the corn earworm, and the clover and alfalfa root curculio are among the objects of these investigations. Seventeen field stations in cooperation with the farmer are distributed over the United States. Thus insects involved in the injury of all cereal and forage crops are investigated from an economic point of view throughout the entire area of distribution. In this way it is practicable to investigate any insect as affected by every variation of condition under which the farmer is obliged to contend with it in his own fields. Investigations are carried out as far as possible in the fields of the farmer, who is thus enabled to see what is being done.

*Scientific staff.*—G. I. Reeves, W. J. Phillips, J. J. Davis, C. N. Ainslie, J. M. Aldrich, A. B. Gahan, V. L. Wildermuth, T. D. Urbahns, G. G. Ainslie, Phillip Luginbill, and R. A. Vickery, entomological assistants; W. R. McConnell, C. W. Creel, D. J. Caffrey, A. F. Satterthwait, L. P. Rockwood, T. R. Chamberlin, C. M. Packard, R. C. Smith, C. F. Turner, T. S. Wilson, A. H. Beyer, F. R. Cole, W. T. Emery, C. C. Hill, P. B. Myers,

R. J. Kewley, J. S. Wade, L. J. Hogg, W. B. Turner, W. O. Hollister, J. R. Horton, M. C. Lane, H. R. Painter, F. W. Poos, D. A. Ricker, R. H. Van Zwaluwenburg, H. E. Smith, A. C. Burrill, A. L. Ford, and F. H. Gates, scientific assistants; C. H. Gable, specialist in alfalfa insects.

**Deciduous-Fruit Insect Investigations.** A. L. QUAINSTANCE, *Entomologist in charge.*

Insects injurious to orchards, vineyards, and nut trees are studied in this work. Field laboratories are maintained in important fruit-growing regions, as in Pennsylvania, Michigan, Colorado, New Mexico, California, Florida, Virginia, and Washington State. Experiments in the use of insecticides and spraying apparatus are made. The important projects include: Investigations of apple insects, as the codling moth, apple borers, and apple aphids; investigations of peach insects, as the peach borer, plum curculio, etc.; investigations of grape insects, as the grape Phylloxera, grape-berry moth, and miscellaneous grape insects; and investigations of nut insects, as those affecting the pecan and chestnut. Other projects are: Cranberry and small-fruit insect investigations, investigations of orchard insecticides and spraying machinery, control of deciduous-fruit insects by natural agencies, and deciduous-fruit nursery insect investigations.

*Scientific staff.*—F. E. Brooks and E. W. Scott, entomologists; J. B. Gill, A. C. Baker, R. L. Nougaret, G. A. Runner, J. J. Culver, R. A. Cushman, E. B. Blakeslee, W. B. Wood, E. H. Siegler, J. H. Paine, F. L. Simanton, and W. D. Whitcomb, entomological assistants; Alden T. Speare, mycoentomologist; N. E. McIndoo, insect physiologist; M. A. Yothers, specialist in apple insect investigations; W. S. Abbott,<sup>1</sup> E. J. Newcomer, W. M. Davidson, A. J. Ackerman, R. J. Fiske, Dwight Isely, H. K. Plank, P. W. Mason, B. R. Leach, W. O. Ellis, B. A. Porter, Wm. A. Hoffman, E. R. Selkregg, R. B. McKeown, and L. C. Antles, scientific assistants.

**Tropical and Subtropical Fruit Insect Investigations.** C. L. MARLATT, *Entomologist and Assistant Chief of Bureau, in charge.*

Insects affecting all tropical and subtropical fruits are subjects of research, including those affecting the various species of citrus, olive, fig, etc., and greenhouse pests. The principal methods of control are investigated, namely, fumigation with hydrocyanic-acid gas, trapping, and spraying with contact and poison insecticides. The important projects include: Citrus-fruit insect investigations in California, citrus-fruit insect investigations in Florida, investigations of the Argentine ant in relation to citrus fruits, investigations of insects affecting tropical and subtropical plants in greenhouses, and investigations of miscellaneous subtropical insects.

*Scientific staff.*—R. S. Woglum, entomologist; W. W. Yothers, entomological assistant; A. D. Borden, scientific assistant; E. R. Sasscer, H. L. Sanford, and N. Perrine, collaborators.

**Investigations of the Mediterranean and Other Fruit Flies.** C. L. MARLATT, *Entomologist and Assistant Chief of Bureau, in charge.*

Investigation and control, in cooperation with the Federal Horticultural Board, of the Mediterranean and other fruit flies. Determination of the geographical distribution and importance of fruit-fly enemies of cultivated fruits as a basis for adequate quarantine or regulatory action, including studies of life history, means of artificial control, and control through the introduction and distribution of natural enemies. The important projects include: Control of export Hawaiian fruit, control of foreign fruit offered for entry, investigations of foreign fruit offered for entry, and geographical distribution and life-history studies of fruit flies.

*Scientific staff.*—C. E. Pemberton, entomologist; H. F. Willard, fruit-fly quarantine inspector; Harold Morrison, entomological explorer; W. M. Mann, specialist in ants; H. F. Dietz and G. F. Mozzette, entomological inspectors.

**Truck-Crop Insect Investigations.** F. H. CHITTENDEN, *Entomologist in charge.*

Determination, by the usual field experimental and research methods, of the cause, extent, and character of insect injury to vegetable and truck crops, and of the most effective measures of prevention and control. The insects investigated include those affecting the potato, sweet potato, cabbage and other cole crops, beans, peas, and other leguminous food crops, tomato, onion, and melons, cucumber, and other cucurbits. Special attention is given to the Colorado potato beetle, potato tuber moth, potato aphid, potato stalk weevil, potato flea-beetles, onion thrips, bean ladybird, bean aphid and pea aphid, cabbage worms and loopers, root-maggots, cabbage and spinach plant-lice, squash bugs, cutworms, wireworms, grasshoppers, and blister beetles; insects injurious to greenhouse vegetables and certain miscellaneous crops; determination of the life history of sugar-beet infesting insects, including leafhoppers, the root-aphid, sugar-beet

<sup>1</sup> Employed in "Enforcement of insecticide act."

wireworms, false chinch bug, leaf-beetles, white grubs, and other pests; and studies of the agency of insects in the transmission of cucumber and melon wilt and mosaic, potato blight, "calico" wilt of tomatoes, white smut of spinach, curly-top of sugar beets, anthracnose of beans, and similar diseases. This office is also charged with the direction of the campaign for the control and eradication of the sweet-potato weevil in the Gulf States.

*Scientific staff.*—C. H. Popeloe, assistant entomologist; J. E. Graf, entomologist in charge of field work, eradication of sweet-potato weevil; T. H. Jones, M. M. High, F. A. Johnston, and D. E. Fink, entomological assistants; C. F. Stahl, R. E. Campbell, B. L. Boyden, J. E. Dudley, Jr., C. E. Smith, F. M. Wadley, A. E. Mallory, R. W. Hartwell, W. H. White, C. H. Batchelder, and W. T. Ham, scientific assistants; K. L. Cockerham, S. H. Rountree, T. H. Cutrer, and W. H. Merrill, special field agents in sweet-potato weevil eradication.

**Stored-Product Insect Investigations.** E. A. BLACK, *Entomologist in charge.*

Studies of both common and newly introduced insects injuriously affecting stored wheat, corn, oats, and other grains and flour, meal, and other mill products, including all cereal foodstuffs in flour mills, elevators, and warehouses, involving special investigation of railway and steamboat lines as carriers of infestation; study of the insect enemies of dried fruits and nuts, beans, peas, and cowpeas, and cured meats, hides, furs, and manufactured fabrics; and investigation and demonstration of appropriate measures for the control of such insects, including tests of promising and standard fumigants and other insecticides against these species, and of kiln-drying and heat methods against grain pests, especially grain weevils, and of those attacking edible legumes.

*Scientific staff.*—F. B. Milliken, scientific assistant.

**Forest Insect Investigations.** A. D. HOPKINS, *Forest Entomologist in charge.*

Investigations are conducted in the field and laboratory of the scientific and economic problems in connection with insects affecting forest, shade, and ornamental trees and hardy shrubs and forest products, with an ultimate view to the development and perfection of practical methods of control and prevention. These investigations include studies of beneficial as well as destructive insects as they affect such trees and shrubs in life and in all subsequent stages of use. Permanent field stations are distributed in the principal forested areas of the country, to serve as headquarters and centers of their respective districts, for the investigation of local insect problems. Demonstrations of practical control methods are undertaken through correspondence with, or direct supervision of private individuals or officers in charge of forests, wood lots, parks, or city shade trees and ornamental shrubs.

*Scientific staff.*—J. M. Miller (in charge of Pacific Slope station at Ashland, Oreg.), assistant forest entomologist; H. E. Burke (in charge of forest-insect laboratory at Los Gatos, Cal.), W. D. Edmonston (in charge of Southern Rocky Mountain station at Colorado Springs, Colo.), T. E. Snyder, and F. C. Craighead, specialists in forest entomology; Jacob Kotinsky, entomological assistant; A. B. Champlain, assistant in forest entomology; S. A. Rohwer, specialist in forest Hymenoptera (in charge of eastern station at East Falls Church, Va.); A. G. Böving, expert; C. T. Greene, specialist on forest Diptera; W. S. Fisher, specialist on forest Coleoptera; Carl Heinrich, specialist on forest Lepidoptera; F. B. Herbert, J. H. Pollock, Raymond A. St. George, and Ada F. Kneale, scientific assistants.

**Investigations of Insects Affecting the Health of Man and Animals.** Under immediate direction of the Chief of Bureau. W. D. HUNTER and W. D. PIERCE, *Entomologists.*

This field covers the relation between certain ticks and spotted fever, mosquitoes and malaria and yellow fever, and the house fly and typhoid fever. The investigations also deal with insects as internal and external parasites of animals and seek practical methods for their control. A number of pests affecting domestic animals, including the cattle tick, the stable fly, and the horn fly, are being studied.

*Scientific staff.*—F. C. Bishopp, entomologist; J. L. Webb, R. H. Hutchinson, W. V. King, H. P. Wood, E. W. Laake, D. C. Parman, and W. H. Dumont, entomological assistants.

**Investigations in Bee Culture.** E. F. PHILLIPS, *Apiculturist in charge.*

The structure, development, and behavior of the bee are being investigated. Special attention is given to methods of wintering, with chief emphasis at present on the proper temperature and construction of bee cellars and methods of preparing bees for outdoor wintering. Bee diseases are being thoroughly studied. Better beekeeping and the production of larger crops of honey are stimulated through the efforts of a large field force.

*Scientific staff.*—G. S. Demuth, apicultural assistant; A. P. Sturtevant, specialist in the bacteriology of bee diseases; G. H. Cale, extension apiculturist; E. W. Atkins, E. G. Baldwin, E. C. Davis, G. A. Hammer, H. L. McMurry, J. V. Ormond, E. S. Prevost, G. H. Rea, R. V. Rhine, C. L. Sams, H. A. Scullen, Jay Smith, W. A. Smith, C. F. Stiles, L. R. Watson, and R. F. Wixson, field agents.

**Gipsy Moth and Brown-tail Moth Investigations.** A. F. BURGESS, *Entomologist in charge.*

A large field force is maintained in New England in the work of preventing the spread of these two moths. A laboratory has been established for the assemblage, study, and liberation of imported parasites and diseases affecting these moths. The work of the parasites and their natural enemies is studied in the field and many experiments are conducted for the purpose of devising better methods for use in field operations. A quarantine is maintained, and all products likely to carry these insects are inspected before they are shipped from the infested area.

*Scientific staff.*—L. H. Worthley, agent, preventing spread of moths; D. M. Rogers, assistant in charge of gipsy-moth quarantine and inspection; S. S. Crossman, C. W. Collins, R. W. Glaser, F. H. Mosher, and R. Wooldridge, entomological assistants; J. V. Schaffner, Jr., C. E. Hood, R. T. Webber, and D. W. Jones, scientific assistants; Willis Munro, assistant in forest management; H. L. McIntyre, C. W. Minott, H. W. Vinton, D. G. Murphy, A. W. Young, A. M. Wilcox, H. R. Gooch, W. A. Swinkwin, L. E. Gibson, H. L. Blaisdell, F. W. Foster, I. T. Guild, C. B. Russell, D. D. Landers, W. A. Collins, F. W. Graham, H. I. Winchester, P. S. Coffin, and H. J. Miles, gipsy-moth assistants; H. A. Ames, H. N. Bean, and F. W. Graves, Jr., general foremen.

**Miscellaneous Investigations.** *Under immediate direction of the Chief of Bureau.*

The naming, classification, and establishment of the systematic relationships of all insects which are being studied in the various laboratories of the bureau, and the identification of similar material submitted by the agricultural experiment stations and by scientific workers are included under this head.

*Scientific staff.*—C. H. T. Townsend, J. M. Aldrich, Rolla P. Currie, and C. S. Menagh, entomological assistants; E. A. Schwarz, A. N. Caudell, and H. S. Barber, assistants.

**Editorial Office.** ROLLA P. CURRIE, *Editor*; LUCILE H. QUARRY, *Assistant*.

The editorial office attendants to the editing of manuscripts, the reading of proofs of publications and other printed matter, correspondence relating to manuscripts, proofs, and publications, and other work of a similar nature.

**BUREAU OF BIOLOGICAL SURVEY.**

[Those whose names are starred (\*) are on furlough for military service.]

*Biologist and Chief of Bureau.* E. W. NELSON; *Assistant Chief.* W. C. HENDERSON; *Administrative Assistant.* A. B. MORRISON; *Chief Clerk and Executive Assistant.* E. J. THOMPSON; *Executive Assistant.* W. H. CHEESMAN.

The Bureau of Biological Survey has charge of the work of the department relating to the control and conservation of wild birds and mammals and investigations of their relation to agriculture. It studies their food habits and investigates methods of protecting beneficial species and controlling harmful ones; experiments in fur farming; controls injurious mammals in national forests and other public domain; makes biological surveys of areas, studies the geographic distribution of wild animals and plants, and maps natural life zones; supervises national mammal and bird reservations; and administers Federal laws protecting birds and game and regulating interstate commerce in game and importations of wild birds and mammals.

*Consulting biologists.*—H. W. Henshaw, C. Hart Merriam.

**Economic Investigations.**

A. K. FISHER, *Assistant in charge.*

**Destruction of Injurious Rodents.** W. B. BELL and S. E. PIPER, *Assistant Biologists.*

Under this project extensive campaigns are carried on in national forests and other public domain to destroy prairie-dogs, ground squirrels, pocket gophers, rabbits, and other rodents destructive to forest, orchard, and nursery stock, farm produce, and ranges. Demonstrations also made in farming districts of improved methods of combating these animals.

*Field staff.*—G. F. Bateman, C. F. Bliss, J. G. Crick,\* W. E. Crouch, U. S. Ebner, I. N. Gabrielson, F. E. Garlough, D. A. Gilchrist, R. T. Jackson, Joseph Keyes,\* F. G. Lewis, A. B. Plummer,\* B. B. Richards, G. A. Roosevelt, T. H. Scheffer, James Silver, Duane Stonier.

**DESTRUCTION OF PREDATORY MAMMALS.** W. B. BELL and S. E. PIPER, *Assistant Biologists.*

Active campaigns are undertaken for the extermination of wolves, coyotes, mountain lions, and other animals destructive of live stock and poultry.

*Field inspectors.*—E. F. Averill, R. E. Bateman, C. J. Bayer, L. B. Crawford, L. J. Goldman, G. E. Holman, S. G. Jewett, C. R. Landon, J. S. Ligon, M. E. Musgrave, H. M. Reid, E. R. Sans.

**FUR-FARMING INVESTIGATIONS.** NED DEARBORN, *Assistant Biologist.*

Investigations in fur farming are concerned with determining productive and economical methods of rearing foxes, minks, martens, and other fur animals in captivity, and ascertaining the areas suited to this industry.

*Fur-farm keeper.*—G. A. Jeffreys\* (Keeseville, N. Y.).

**ECONOMIC ORNITHOLOGY.** W. L. MCATEE, *Assistant Biologist.*

This section investigates the food habits of birds for the purpose of determining the value of birds to agriculture, horticulture, and forestry. By laboratory analyses of stomach contents and by field observations birds are classed as beneficial, neutral, or harmful in their relation to man, and recommendations are made for the protection of useful species and the repression of injurious ones. The food habits of waterfowl and upland game birds are investigated with a view to securing information of use in increasing the food supply in depleted areas. Methods of attracting desirable species about homes are studied and recommended.

*Scientific staff.*—L. L. Buchanan,\* E. A. Chapin, E. G. Holt,\* J. D. Hood,\* L. O. Jackson,\* E. R. Kalmbach, F. P. Metcalf,\* H. L. Viereck, Alexander Wetmore.

**BIOLOGICAL INVESTIGATIONS.**

E. W. NELSON, *Chief, in charge.*

Under this division investigations are conducted in the field to determine the geographic distribution of native wild life, and technical studies are made of groups and species to ascertain relationships and correct classification. The information gathered serves as a foundation for the efficient handling of most of the problems of the Survey. The published results appear in the form of reports on special groups of birds and mammals; also, on the birds and mammals of States and special areas, with maps and charts showing distribution of species and life-zone areas.

**BIOLOGICAL SURVEYS AND DISTRIBUTION OF MAMMALS.** VERNON BAILEY, *Chief Field Naturalist*, and E. A. PREBLE, *Assistant Biologist.*

This section conducts investigations to determine the distribution of native animals and plants. Maps are made showing areas occupied by each species of mammal and the summer and winter ranges and migration routes of birds, and from the combined data the natural distribution areas and life zones of the country are outlined. North American mammals are studied in order to determine the distribution, habits, and value of the different species and to secure data concerning areas to be restocked with big game; also to locate suitable areas for fur farming. Specimens of mammals are identified for Government bureaus, scientific and educational institutions, and private individuals.

*Scientific staff.*—G. G. Cantwell, E. A. Goldman,\* A. H. Howell, H. H. T. Jackson, H. C. Oberholser, H. H. Sheldon, W. P. Taylor.

**DISTRIBUTION AND MIGRATION OF BIRDS.** H. C. OBERHOLSER, *Assistant Biologist.*

This section investigates the migration of North American birds, mainly through reports from several hundred volunteer observers and through the work of field parties. The data obtained serve as a basis for protective legislation, both State and national. A national count of birds, made each spring by several hundred observers throughout the United States, is also of value in connection with the conservation and increase of useful species. Enumerations of migratory waterfowl, combined with an investigation of conditions in their breeding grounds and winter resorts, furnish information which will greatly assist in the conservation of these birds. Specimens of birds are identified for Government bureaus and for educational institutions, museums, and private individuals.

*Scientific staff.*—Francis Harper,\* A. H. Howell, E. A. Preble.

**Protection of Migratory Birds.***G. A. LAWYER, Chief U. S. Game Warden, in charge.*

This division administers the Federal migratory-bird treaty act and publishes and enforces regulations made thereunder for the protection of migratory game, nongame, and insectivorous birds; and issues permits to collect and possess migratory birds for scientific purposes and migratory waterfowl for propagation. In the enforcement of the law 14 United States game wardens, each assigned to a particular district, cooperate with State authorities—about 200 State deputy game wardens acting as United States deputy game wardens. Under this division also are issued permits for shipments from Alaska of specimens for scientific and exhibition purposes. Information concerning game is prepared for publication; a card index of State game laws and various indexes of information concerning game protection are maintained; and summaries of State and Federal game laws and a directory of game officials are issued annually. That portion of the Lacey Act regulating interstate shipments of birds and plumage is now covered in the migratory-bird treaty act. Violations of the Lacey Act regulating interstate commerce in game animals are investigated by the field force, the necessary evidence is collected, and the first steps taken in preparing each case for legal action.

*Assistants.*—\_\_\_\_\_, F. L. Earnshaw. *U. S. Game Wardens.*—W. S. Holt (Lowell, Mass.), P. S. Farnham (Owego, N. Y.), Albert Stadlmeir (Lackawanna, N. Y.), T. T. Bloxom (Locustville, Va.), T. S. Meekins (Manteo, N. C.), E. V. Visart (Little Rock, Ark.), S. W. Linebaugh (Russellville, Ky.), B. G. Merrill (Hinsdale, Ill.), C. P. S. Smith (Chicago, Ill.), B. J. Shaver (Ashland, Wis.), Harry Barmeier (St. Louis, Mo.), R. P. Holland (Atchison, Kans.), H. H. Kopman (New Orleans, La.), E. S. Cattron (Portland, Oreg.), W. H. Ransom (Spokane, Wash.), George Willett (Los Angeles, Cal.).

**Importations of Foreign Birds and Mammals.***T. S. PALMER, Expert in Game Conservation, in charge.*

This division issues permits for importations and regulates the entry of foreign wild birds and mammals.

**Mammal and Bird Reservations.***G. W. FIELD, Assistant in charge.*

This division has supervision over the 74 Federal mammal and bird reservations. The 5 big game reservations are the Montana National Bison Range; the Winter Elk Refuge in Jackson Hole, Wyoming; the game preserves on the Wind Cave National Park, South Dakota, and Sullys Hill National Park, North Dakota; and the Niobrara Reservation, Nebraska. Birds also are protected on these reservations.

*Reservation inspectors.*—F. M. Dille (Valentine, Nebr.), B. J. Pacetti (Ponce Park, Fla.).

**DIVISION OF ACCOUNTS AND DISBURSEMENTS.**

*Chief of Division and Disbursing Clerk, A. ZAPPONE; Administrative Assistant, W. J. NEVIUS; Deputy Disbursing Clerk, H. B. PEFFERS.*

This division has charge of the disbursement of public funds appropriated for the Department of Agriculture and the keeping of accounts and appropriate ledgers in connection therewith.

**Cashier's section.** *W. R. FUCHS, Cashier and Chief Clerk, in charge.*

This section prepares and mails all checks and handles all moneys received and disbursed and handles the vouchers in connection with the Weeks forestry law.

**Bookkeepers section.** *H. B. PEFFERS, acting in charge.*

This section keeps the books pertaining to the fiscal affairs of the department, prepares requisitions on the Treasury for advance of public funds, and compiles quarterly abstracts of expenditures and collections and an account current covering the liability for public funds.

**Examining and miscellaneous section.** *J. M. KEMPER, Jr., Supervising Auditor, in charge*

This section examines all accounts before payment and performs miscellaneous work not assigned to other sections.

**PUBLICATION AND INFORMATION WORK.**

CLARENCE OUSLEY, *Assistant Secretary of Agriculture, in charge.*

**Publications.** EDWY B. REID, *Chief; B. D. STALLINGS, Assistant Chief; A. L. MUDD, Chief Clerk.*

This division supervises, under the direction of the Assistant Secretary, the publication work of the department; conducts all business of the department transacted with the Government Printing Office, has general supervision of all printing, indexing, illustration, binding, and distribution of publications, and the maintenance of mailing lists.

**Editorial.** EDWY B. REID, *Chief Editor, in charge.*

The work of this office includes the consideration and critical examination of all manuscripts submitted for publication by the various bureaus, divisions, and offices of the department. In making constructive criticisms and suggestions for the improvement of manuscripts, the chief editor is authorized to consult fully and freely with the chiefs of the bureaus, divisions, and offices, the authors of manuscripts, and any other officer or employee of the department.

**Printing.** B. D. STALLINGS, *Assistant Chief, in charge.*

This section receives and transmits to the printer all matter to be printed. It keeps the records showing the receipt of manuscripts for publication and for miscellaneous printing of every description. It receives and distributes all proof and examines that of miscellaneous printing, prepares correspondence relating to printing and illustrations, and inspects completed work.

**Indexing.** CHARLES H. GREATHOUSE, *Assistant in charge.*

Two kinds of indexes are made: (1) Indexes to be printed with individual publications; (2) a general card index, by subjects, of all publications of the department. Congressional documents are obtained for department officials, and the Congressional Record is marked daily for their attention.

**Illustrations.** A. B. BOETTCHER, *Assistant in charge.*

Drawings and photographs are made for use in illustrating publications and also for use in the various branches of the department's work. Photographic prints and lantern slides are sold to the public.

**Distribution of Publications.** FRANCIS J. P. CLEARY, *Superintendent; Document Section, JOHN O. RILEY, Assistant in charge.*

This office receives and distributes the publications designed for departmental use; mails circulars and documents not intended for public distribution; furnishes mailing lists and makes orders upon the Public Printer for the mailing of publications intended for public distribution; specifies the publications to be sent in response to miscellaneous requests; prepares correspondence relating to, and keeps all records of the distribution of publications, including the Congressional quotas of Farmers' Bulletins; addresses franks and envelopes, and prepares addresses for mailing lists, of which a general index is kept up to date; and duplicates official circulars as well as the information prepared for the press.

**Information.** HARLAN D. SMITH, *Chief.*

The Office of Information is established to secure circulation in popular form for the discoveries and recommendations of the scientists, specialists, and field workers of the department. It gives out to the public press agricultural facts taken from publications and official orders, and also from oral statements of specialists. Material so disseminated is set forth in such form as to attract public attention, be easily understandable, and lead to the adoption of the methods recommended. A Weekly News Letter is published. The office also prepares circulars, posters, and pamphlets designed to assist workers in carrying out educational and demonstration plans.

**Motion-Picture Activities.** DON CARLOS ELLIS, *Assistant in charge.*

This office has complete charge of the motion-picture work of the department, prepares scenarios from material furnished by the various bureaus, directs the making of film, supervises the motion-picture laboratory in film manufacture, develops and executes plans for film distribution, and handles the dissemination of information concerning agriculture, forestry, home economics, and other subjects covered by the activities of the department, through the medium of film and lantern slides, in motion-picture theaters.

## BUREAU OF CROP ESTIMATES.

*Statistician and Chief of Bureau*, LEON M. ESTABROOK; *Assistant Chief of Bureau*, NAT C. MURRAY; *Chief of Division of Crop Reports*, EDWARD CRANE; *Chief of Field Service*, SAMUEL A. JONES; *Chief of Division of Crop Records*, FRANK ANDREWS; *Chief Clerk*, CHARLES E. GAGE; *Statistical Scientists*, GEORGE K. HOLMES and CHARLES M. DAUGHERTY.

The Bureau of Crop Estimates collects crop data, issues the monthly crop reports of the department, prepares the statistical portion of the Department Yearbook, and conducts special inquiries relative to estimates of United States and foreign crops and live stock for inclusion in bulletins and correspondence.

## Crop Reporting Board.

A Crop Reporting Board, consisting of the chief of bureau (chairman) and four other members selected from the officials and agents of the bureau, considers in secret session all available data and issues periodic reports relative to acreage in planting season, condition and indicated yield during the growing season, and production and yield at harvest time of the speculative crops (i. e., corn, wheat, oats, and cotton). The chief of bureau and his assistants consider data and issue corresponding reports for nonspeculative crops and live stock.

## Division of Crop Reports.

*Field service*.—The service outside of Washington consists of 42 field agents, 10 crop specialists, and various independent lists of voluntary reporters, numbering in all approximately 200,000. The field agents and crop specialists keep in touch with the best informed opinion throughout their districts by travel and by maintenance of special corps of reporters, and render periodic reports for their respective territories. Of the voluntary correspondents the county reporters submit reports regularly for their respective counties and the township reporters for their respective localities. Summaries of reports from these three independent sources form the bases of the reports issued by the bureau. Special lists of reporters are maintained for special inquiries.

*Clerical force*.—The clerical force of the Division of Crop Reports maintains various independent lists of voluntary crop reporters to whom regular and special blank schedules of inquiry are submitted for data desired. The information so secured is tabulated and arranged in convenient form for study and analysis by the Statistician and Crop Reporting Board.

## Division of Crop Records.

The Division of Crop Records collects and makes available for study and use data relative to the agricultural products of the United States and foreign countries, prepares tables and special articles for the Department Yearbook and bulletins, provides statistical information in response to special inquiries, and conducts inquiries relative to various statistical phases of agriculture. A well-equipped library of agricultural statistics is maintained.

## LIBRARY.

*Librarian*, CLARIBEL R. BARNETT; *Assistant Librarian*, EMMA B. HAWKS.

The department library, consisting of the main library and the various bureau, division, and office libraries, contains approximately 145,000 books and pamphlets, including an extensive collection on agriculture and all its branches, a large and representative collection on the sciences related to agriculture, and a good collection of standard reference books. In addition to the department use, books are lent to college and experiment station libraries and other institutions for use in connection with the researches of these institutions. Periodicals currently received number more than 2,300. A dictionary card catalogue is maintained consisting of about 375,000 cards. Printed catalogue cards for publications of the department are prepared by the department library and printed at the Library of Congress. The librarian has charge of the foreign mailing lists for department publications.

## STATES RELATIONS SERVICE.

*Director*, A. C. TRUE.

The States Relations Service represents the Secretary of Agriculture in his relations with the State agricultural colleges and experiment stations under the acts of Congress granting funds to these institutions for agricultural experiment stations and cooperative extension work in agriculture and home economics, and in carrying out the provisions of

acts of Congress making appropriations to this department for farmers' cooperative demonstration work, investigations relating to agricultural schools, farmers' institutes, and home economics, and the maintenance of agricultural experiment stations in Alaska, Hawaii, Porto Rico, Guam, and the Virgin Islands of the United States of America.

#### Office of the Director.

EUGENE MERRITT, *Administrative Assistant*; Mrs. C. E. JOHNSTON, *Chief Clerk*; F. E. SINGLETON, *Chief Accountant*; Miss E. L. OGDEN, *Librarian*.

#### Editorial Division. W. H. BEAL, *Chief*.

This division edits and prepares for printing all publications of the States Relations Service except Experiment Station Record; cooperates with the Division of Publications in maintaining mailing lists and in the distribution of publications of the service; and has charge of lantern slides and other illustrative material for service use.

*Staff*.—Reuben Brigham, specialist in visual instruction in agriculture, in charge of section of illustrative material; C. H. Hanson, specialist in visual instruction in agriculture.

#### Investigations on Agricultural Instruction in Schools. ALVIN DILLE, *Specialist in Agricultural Education*.

These investigations include studies of the methods and subject matter of school instruction in agriculture in this and other countries, with a view to determining the needs of such instruction in order to make it practically useful to students who are to become farmers or workers in agricultural institutions, and to furnish schools with up-to-date and properly organized subject matter and illustrative materials in the various branches of agriculture, to supplement and reinforce textbooks and field practices.

#### Investigations on Farmers' Institutes and Movable Schools. J. M. STEDMAN, *Farmers' Institute Specialist*.

These investigations include studies on farmers' institutes, movable agricultural schools, and similar organizations carried on in this and other countries, especially with a view to devising and experimenting with modified or new methods adapted to conditions in the United States, and to providing farmers' institute and extension workers with publications and illustrative material especially adapted to their needs.

#### Office of Experiment Stations.

E. W. ALLEN, *Chief, and Editor of Experiment Station Record*.

#### Relations with Institutions for Agricultural Research.

Under this head the office is broadly organized to exercise the supervision provided by law over the funds and operations of the State agricultural experiment stations under Federal appropriations and to afford such advice and assistance as will best promote their efficiency. It also collects and disseminates information regarding similar institutions throughout the world. Among its activities in relation to the stations are the following:

*Examination of work and expenditures of the State experiment stations*.—The office supervises the Federal funds granted to the State agricultural experiment stations under the acts of Congress of March 2, 1887, and March 16, 1906, with respect to the use made of these funds and the kind of work for which they are employed. This duty is assigned especially to the chief, with the assistance of W. H. Beal, Walter H. Evans, J. I. Schulte, and E. R. Flint.

*Experiment Station Record*.—The office publishes Experiment Station Record, a periodical which gives abstracts of the publications of the experiment stations, the Department of Agriculture, and other institutions and sources reporting investigations in agricultural science in the different countries of the world. The Record also contains editorials and notes bearing upon station work. The staff of the Record is as follows: Editor, E. W. Allen; associate editor, H. L. Knight; agricultural chemistry and agrotechny, Sybil L. Smith; meteorology, soils, and fertilizers, W. H. Beal and J. D. Luckett; agricultural botany, bacteriology, and plant pathology, W. H. Evans and W. E. Boyd; field crops, J. D. Luckett; horticulture and forestry, E. J. Glasson; foods and human nutrition, C. F. Langworthy, Sybil L. Smith, and Elizabeth B. Bower; animal production and dairying, F. J. Kelley; economic zoology and entomology, W. A. Hooker; veterinary medicine, W. A. Hooker and Sybil L. Smith; rural engineering, R. W. Trullinger;\* rural economics, Eugene Merritt and Louise Marbut; agricultural education, A. Dille and Marie T. Spethmann; indexes, Amelia B. Deans.

\* On furlough for military service.

**Division of Insular Experiment Stations.** WALTER H. EVANS, *Chief.*

The experiment stations in Alaska, Hawaii, Porto Rico, Guam, and the Virgin Islands of the United States of America are conducted under the general direction of this division.

**Alaska Agricultural Experiment Stations.** C. C. GEORGESON, *Sitka, Agronomist in charge.*

The main station in Alaska is at Sitka. Investigations are also carried on at Rampart, in the Yukon Valley; at Kodiak; at Fairbanks, in the valley of the Tanana River; and at Matanuska, near the Government railroad. The work consists of field experiments with vegetables, cereals, and forage plants; horticultural investigations; the maintenance of live stock; the curing of hay and silage; the distribution of seeds; and an agricultural survey of the Territory.

*Staff.*—G. W. Gasser, assistant in charge, Rampart; M. D. Snodgrass, assistant in charge, Fairbanks; W. T. White, assistant, Fairbanks; H. E. Pratt, assistant in charge, Kodiak; F. E. Rader, assistant in charge, Matanuska.

**Hawaii Agricultural Experiment Station.** J. M. WESTGATE, Honolulu, *Agronomist in charge.*

The activities of this station are concerned with cotton, rice, forage crops, fiber, and horticultural plants; with soils, plant diseases, insects, and extension and demonstration work. In cooperation with the Hawaiian Government, a demonstration farm is maintained on the island of Hawaii.

*Staff.*—J. E. Higgins, horticulturist; J. H. Cowan,\* assistant in horticulture; M. O. Johnson, chemist; K. A. Ching, assistant chemist; C. W. Carpenter, plant pathologist; R. A. Goff, in charge of Glenwood substation; F. G. Krauss, superintendent of extension work.

**Porto Rico Agricultural Experiment Station.** D. W. MAY, Mayaguez, *Agronomist in charge.*

Investigations of this station relate especially to the growing of coffee, field crops, and horticultural plants, the development of animal husbandry and dairying, soils, vegetable pathology, and entomology. Cooperative and demonstration work is also in progress.

*Staff.*—L. G. Willis, chemist; J. O. Carrero, assistant chemist; T. B. McClelland, horticulturist; Forrest E. Kempton, plant pathologist; W. P. Snyder, assistant in plant breeding; W. V. Tower, entomologist; H. C. Henricksen, specialist in farm management; and W. A. Mace, agricultural technologist.

**Guam Agricultural Experiment Station.** C. W. EDWARDS, *Animal Husbandman in charge.*

The station in Guam is located near Agaña, the principal town. Experiments are being conducted in improved methods of cultivation, introduction and improvement of tropical agricultural crops, and introduction of improved live stock.

*Staff.*—G. Briggs, agronomist and horticulturist; Joaquin Guerrero, assistant in horticulture; W. J. Green, assistant in agronomy and extension work; P. Nelson, assistant.

**Virgin Islands Experiment Station.** LONGFIELD SMITH, St. Croix, *Agronomist in charge.*

The station is located on St. Croix, the largest island of the group. The experimental work in progress includes plant breeding with cotton and sugar cane, cultural experiments with tropical crops, rotations, green-manure crops, plant diseases and insect pests, soil and chemical studies, etc.

*Staff.*—Longfield Smith, agronomist in charge.

**Office of Extension Work in the South.**

BRADFORD KNAPP, *Chief.*

**Relations with Extension Divisions of Agricultural Colleges in 15 Southern States.**

Under this head the office cooperates with the extension divisions of the State agricultural colleges within its territory in their extension work in agriculture and home economics, under the act of Congress of May 8, 1914. It also acts as an agency for co-ordinating the extension work of the several bureaus of the department with similar work carried on by the agricultural colleges.

\* On furlough for military service.

**Farmers' Cooperative Demonstration Work.**

Under this head extension and demonstration work on all subjects relating to agriculture, home economics, and rural life generally is carried on through practical demonstrations and instruction under the supervision and management of State, district, and county agents working with individuals and through organizations of farm men and women and boys' and girls' clubs. This work is supported by direct congressional appropriation to the department, but is done in cooperation with State colleges of agriculture, departments of agriculture and education, county governments and organizations, and others. In the cotton territory the work includes the teaching and demonstration of methods of meeting the ravages of the cotton-boll weevil.

*States*.—Texas, Oklahoma, Louisiana, Arkansas, Tennessee, Mississippi, Alabama, Georgia, Florida, South Carolina, North Carolina, Virginia, Maryland, West Virginia, and Kentucky.

*Scientific staff*.—County agent work: J. A. Evans, assistant chief; W. B. Mercier, agriculturist and field agent for Arkansas, Louisiana, Tennessee, and North Carolina, and in general charge of cooperative projects; H. E. Savelly, agriculturist and field agent for Mississippi, Alabama, South Carolina, Georgia, and Florida; E. A. Miller, agriculturist and field agent for Kentucky, Maryland, Virginia, and West Virginia; C. H. Alvord, agriculturist and field agent for Texas and Oklahoma; I. O. Schaub, in general charge of work of specialists. Boys' and girls' club work and home demonstration work: O. B. Martin, assistant in general charge; I. W. Hill, assistant in charge, and C. L. Chambers, assistant in boys' club work; Ola Powell, assistant in home demonstration and girls' club work; Madge J. Reese and Hannah L. Wessling, assistants in home demonstration work; Frants P. Lund, specialist in drying and canning; Mary E. Keown, assistant in extension work for women.

H. W. Barber, assistant in charge of crop records and statistics.

W. H. Conway and F. M. McLaughlin, executive assistants.

Specialists detailed by subject-matter divisions of the department to act through the Office of Extension Work in the South in relation to the field work in the various Southern States: Dan T. Gray, representing animal husbandry; J. H. McClain, representing dairy husbandry; W. R. Mattoon, representing forestry; J. W. Kinghorne, representing poultry husbandry; C. L. Goodrich, representing farm management; J. A. Hyslop, representing entomology; and L. O. Watson, representing cotton and truck-crop diseases.

*Field extension staff*.—County agent and boys' club work (men agents): 15 State agents, 22 assistant State agents, 70 district agents, 1,041 county agents, 9 assistant county agents, 51 special community leaders in club work, 142 colored local agents. Home demonstrations and girls' club work (women agents): 15 State agents, 17 assistant State agents, 51 district agents, 841 county agents, 81 city agents, 157 colored local agents, 20 colored city agents. Total, 2,532.

**Office of Extension Work in the North and West.**

C. B. SMITH, *Chief*; C. E. GUNNELS, *Assistant Chief*.

**Relations with Extension Divisions of Agricultural Colleges in 33 Northern and Western States.**

Under this head the office cooperates with the extension divisions of the State agricultural colleges within its territory in their plans and expenditures for extension work in agriculture and home economics under the act of Congress of May 8, 1914. It also acts as an agency for coordinating the extension work of the several bureaus of the department with similar work carried on by the agricultural colleges.

**Farmers' Cooperative Demonstration Work.**

Under this head extension and demonstration work on subjects relating to agriculture, home economics, and rural life generally is carried on through practical demonstrations and instruction under the supervision and management of State, district, and county agents working through organizations of farm men and women and boys' and girls' clubs. This work is in cooperation with State colleges of agriculture, county governments and organizations, and others. Demonstrations in farm management form a special line of work.

*States*.—Arizona, California, Colorado, Connecticut, Delaware, Idaho, Illinois, Indiana, Iowa, Kansas, Maine, Massachusetts, Michigan, Minnesota, Missouri, Montana, Nebraska, Nevada, New Hampshire, New Jersey, New Mexico, New York, North Dakota, Ohio, Oregon, Pennsylvania, Rhode Island, South Dakota, Utah, Vermont, Washington, Wisconsin, Wyoming.

*Scientific staff*.—Cooperative relations: C. E. Gannels, assistant chief, in charge; D. W. Working, agriculturist. County agent work: W. A. Lloyd, agriculturist, in charge; H. B.

Fuller, H. W. Gilbertson, L. R. Simonds, O. S. Fisher, M. C. Wilson, H. W. Hochbaum, and T. W. Harvey, agriculturists. Extension work with women: Florence E. Ward, assistant agriculturist, in charge; Miriam Birdseye, Emma Conley, Grace E. Frysinger, Winifred E. Gibbs, Jessie M. Hoover, Edith A. Roberts, Edith C. Salisbury, Sarah Pettit, and Gertrude Van Hoesen, assistants. Boys' and girls' club work: O. H. Benson, agriculturist, in charge; G. E. Farrell, T. J. Newbill, Gertrude Warren, G. R. Simcox, H. B. Hendrick, and Agnes Morton, assistants; Grace Goodpasture and Bertina Thompson, field agents. Farm management demonstrations: L. A. Moorhouse, agriculturist, in charge. Administrative subject-matter specialists: A. B. Graham, assistant agriculturist, in charge; H. J. Wilder, agriculturist, extension specialist in soils; C. P. Close, extension specialist in pomology; R. H. Elsworth, extension specialist in cooperative marketing; Helmer Rabild, extension specialist in dairying; W. R. Beattie, extension specialist in vegetable gardening; J. T. Caine, III, extension specialist in animal husbandry; J. A. Hyslop, extension specialist in entomology; M. F. Barrus, extension specialist in plant pathology; H. B. Humphrey, extension specialist in cereal seed treatment.

F. G. Harden, scientific assistant, in charge publications and manuscripts.

S. R. Horton, executive assistant.

*Field extension staff.*—County-agent work: 32 State leaders, 135 assistant State leaders, 1,306 county agents and assistant county agents. Boys' and girls' club work: 28 State leaders, 110 assistant State leaders, 625 local or county leaders. Farm-management demonstrations: 24 State demonstrators, 9 assistant State demonstrators. Extension work with women: 33 State leaders, 50 assistant State leaders, 461 county home-demonstration agents, 102 city home-demonstration leaders.

#### OFFICE OF HOME ECONOMICS.

C. F. LANGWORTHY, *Chief.*

#### STUDIES OF FOOD, DIETETICS, CLOTHING, AND HOUSEHOLD EQUIPMENT, WORK, AND MANAGEMENT.

The Office of Home Economics investigates, both from the scientific and practical standpoint, the nature and uses of agricultural products utilized in the home for food, clothing, and equipment, and the methods of household work and management. The publications of the Office of Home Economics make available to housekeepers, teachers, students, and extension workers the results of such studies and the results of practical experience gathered in the home and elsewhere. Respiration calorimeter investigations include a study of food, clothing, and household equipment and household work with particular reference to energy values and efficiency. Special respiration calorimeter investigations on other subjects included within the work of the department are carried on in cooperation with the different bureaus.

*Scientific staff.*—Helen W. Atwater, Helena M. Bailey, H. G. Barott, Elizabeth B. Bower, Minna C. Denton, W. B. Emerson, A. D. Holmes, Caroline L. Hunt, and Fannie W. Yeatman, assistants.

#### BUREAU OF PUBLIC ROADS.

[Those whose names are starred(\*) are on furlough for military service.]

*Director.* —————; *Chief Engineer.*, P. ST. J. WILSON; *Chief of Management*, J. E. PENNYBACKER; *General Inspectors*, T. WARREN ALLEN and E. W. JAMES.

In addition to the work comprised in the regular appropriations of the Bureau of Public Roads, the administration of the Federal Aid Road Act has been intrusted by the Secretary of Agriculture to the director of the bureau. The organization of the bureau has been revised so as to meet this new responsibility through the creation of two main branches of the bureau, known respectively as (1) Engineering and (2) Management and Economics. The Engineering branch deals with the engineering activities of the bureau under both the Federal Aid Road Act and the regular appropriations, except engineering economics. The Management and Economics branch deals with the administrative, legal, and economic work of the bureau under both the regular appropriations and the Federal Aid Road Act.

The Bureau of Public Roads investigates systems of road management and methods of road construction and maintenance; details engineers to instruct local officials in road building through supervising object-lesson roads; gives advice to State and county authorities on all matters relating to road construction, maintenance, and management; investigates the location, properties, and economic values of road materials; constructs experimental roads to demonstrate and test methods and materials of construction; investigates the effect of various kinds of traffic on road surfaces; studies traffic regulations; compiles

statistics relating to public roads; conducts educational work through lectures, the distribution of lantern slides, and the exhibit of models; cooperates with the Forest Service on road work conducted with the proceeds of the 10 per cent appropriation from forest receipts; has charge of the survey, construction and maintenance of roads in and adjacent to the national forests for which appropriation is made in section 8 of the Federal Aid Road Act; conducts, under instructions from the Secretary of Agriculture, the operation of the Federal Aid Road Act, under which aid is granted to the several States in the construction of rural post roads; investigates and reports concerning the best methods of utilization of water in farm irrigation and concerning the development of the most efficient equipment for farm irrigation; studies the duty, apportionment, and measurement of irrigation water, and the customs, regulations, and laws affecting irrigation; gives advice and assistance in farm irrigation; investigates and reports upon the drainage of farms and of swamp and other wet lands otherwise available for agriculture; conducts field experiments and investigates in regard to construction and equipment in farm-drainage systems; gives advice and assistance in farm drainage; Investigates the domestic water supply and drainage disposal of the farm; investigates and gives advice on construction of farm buildings, farm machinery, and on other rural engineering problems.

**Road Management Investigations.** *J. E. PENNYEACKER, Chief of Management, in charge.*

This work, in general, embraces engineering economics relating to the various lines of activity conducted by the office and specifically to highways; legislative investigations, the collection and compilation of statistical data, the management of the educational work which is conducted by means of lectures and exhibits, and the advisory work with reference to economics, legislation, and management. The chief of management has charge, in addition to the foregoing lines of work, of the general administrative work of the entire organization and of the administrative and legal questions arising out of the administration of the Federal Aid Road Act.

*Scientific staff.*—M. O. Eldridge and L. E. Boykin, assistants in road economics; R. F. Eastham and H. S. Fairbank, senior highway engineers; A. P. Anderson and J. L. Harrison, highway engineers; G. C. Clarke, R. E. Gray, and A. L. Luedke, engineer-economists; H. W. Hendley, model maker.

**Road Construction and Maintenance.** *P. ST. J. WILSON, Chief Engineer; A. E. LODER, Assistant Chief Engineer; V. M. PEIRCE, Assistant Engineer; O. L. GROVER, Bridge Engineer.*

*Post road construction and forest road construction and maintenance.*—This work covers the construction of rural post roads in cooperation with the State highway departments and the survey, construction, and maintenance of national forest roads in cooperation with the Forest Service and the State and local authorities.

For convenience in handling the work 10 districts have been established, as follows: No. 1, Washington, Oregon, Idaho; No. 2, California, Nevada, Arizona, New Mexico; No. 3, Montana, Wyoming, Utah, Colorado; No. 4, North Dakota, South Dakota, Minnesota, Wisconsin; No. 5, Nebraska, Iowa, Kansas, Missouri; No. 6, Texas, Oklahoma, Arkansas, Louisiana; No. 7, Michigan, Illinois, Indiana, Kentucky; No. 8, Tennessee, Mississippi, Alabama, Georgia, South Carolina, Florida; No. 9, Maine, New Hampshire, Massachusetts, Vermont, New Jersey, Connecticut, Rhode Island, New York, Delaware; No. 10, Ohio, Pennsylvania, Maryland, West Virginia, Virginia, North Carolina.

*Scientific staff.*—District engineers: District No. 1, L. I. Hewes; District No. 2, B. J. Finch (C. H. Sweetser\*); District No. 3, J. A. Whittaker; District No. 4, E. O. Hathaway; District No. 5, J. C. Wonders; District No. 6, J. D. Fauntleroy; District No. 7, J. T. Voshell; District No. 8, J. T. Bullen; District No. 9, G. H. Miller; District No. 10, H. K. Bishop.

*Road building and maintenance investigations.*—These investigations cover the building of object-lesson roads and object-lesson bridges; the development of county road systems; making inspections and giving expert advice on road and bridge construction; the superintendence of county roads; the making of road surveys; systems of road maintenance; the maintenance of object-lesson, experimental, and post roads; conducting object lessons in road maintenance; the construction of roads within the national forests, in cooperation with the Forest Service; the preparation of typical plans for highway bridges and culverts; and experiments with bridge materials.

*Scientific staff.*—J. S. Bright, W. F. Brooks, C. L. Brown, A. G. Bruce, G. L. Campen, W. A. Crossland, R. V. Glenn, B. F. Heidel, D. E. Henry, G. S. Hubbell, F. D. Hudgins, J. W. Johnson, T. N. Keene, C. H. Kendall, E. E. Kidder, W. H. Lynch, A. R. Losh, H. H. Lotter, W. A. McCalla,\* H. G. McKelvey, G. T. McNab, U. S. Marshall, C. H. Moorefield,\* C. C. Morris, C. B. Morrison, A. I. Ostrander, A. E. Palen, A. C. Rapelje, C. E. Raynor, W. H. Rhodes,\* E. F. Ruggles, George C. Scales, J. T. Schuyler, E. P. Shuman, W. L.

**Spoon, C. H. Stillman, R. E. Toms,\* J. H. Skeggs,\* W. H. Waugh,\* E. S. Wheeler, E. J. Wulff, senior highway engineers; L. G. Bayly, B. E. Gray,\* J. J. Tobin,\* engineer economists; E. S. Alderman,\* J. W. Ball, B. F. Beesley, D. K. Caldwell, J. C. Carpenter, C. W. Cheatham, C. H. Chilvers,\* F. A. Davis, A. C. Dunn, J. A. Elliott, P. A. Everett, Geo. Fuller,\* F. H. Flint, R. H. Harrison,\* H. J. Hemstreet, C. E. Learned, T. Le R. Mathias, J. E. Mincher, J. C. Morrison, B. E. Moses, J. T. Pauls,\* R. Pearson, H. R. Postle, O. N. Powell,\* T. C. Peterson, W. H. Snyder, H. J. Spelman, J. H. Stone, S. LeRoy Taylor, V. E. Towles, H. C. Wells, M. W. Wilbur, J. H. Young, highway engineers; B. B. Hauser, A. L. Hooper,\* W. F. Jeffrey,\* F. R. Lyons,\* junior highway engineers; J. V. McNary, C. H. Purcell, senior highway-bridge engineers; H. R. Angevin, J. S. Clay, L. F. Copeland, W. P. Linton, Geo. D. Whittle, highway-bridge engineers; V. L. Bonner, R. A. Brown,\* J. H. Dodge, J. H. Eldridge, D. G. Haire, C. T. Harrison, L. E. Smith, superintendents road construction; R. D. Brown, R. L. Hughes,\* chiefs survey party; T. L. Ainsworth, C. B. Bessec,\* G. A. Crayton, E. J. Wakefield, engineer draftsmen.**

**Road Material Tests and Research.** PRÉVOST HUBBARD, *Chemical Engineer, in charge of Physical, Chemical, and Concrete Laboratories.*

These investigations cover the routine chemical testing and inspecting of dust preventives and road binders and materials allied to road construction; microscopic examination and classification of road-building rocks; research on properties of dust preventives and road binders; standardization of methods of testing bituminous road materials, experimental bituminous road construction and maintenance; physical testing of road-building materials; nonbituminous road material investigations; standardization of tests on nonbituminous road materials.

*Scientific staff.*—A. T. Goldbeck, engineer of tests; F. H. Jackson, jr., assistant testing engineer; George E. Ladd, economic geologist; H. M. Milburn, chemist; R. H. Lewis, assistant chemist; E. C. E. Lord, petrographer; Mrs. D. G. Taylor, assistant in chemistry of bituminous materials; R. H. Parker, laboratory assistant; W. E. Rosengarten, engineer economist; W. Grant, laboratory helper; J. R. Boyd,\* laboratory apprentice; R. Harsch, laboratory assistant; J. T. Pauls,\* highway engineer; C. E. Proudfley, laboratory assistant; D. O. Wolf,\* laboratory assistant.

**Field Experiments.** P. ST. J. WILSON, *Chief Engineer, and PRÉVOST HUBBARD, Chemical Engineer, in charge of road construction; and E. B. McCORMICK, Mechanical Engineer, in charge of traction tests.*

This work comprises the construction of experimental roads in cooperation with local administrative units for the purpose of demonstrating the best methods of constructing new types of roads and of studying the effect upon these roads of traffic under known conditions; investigations concerning various road materials and preparations; investigating and developing equipment intended for the preparation and application of bituminous and other binders; and the conduct of traction tests in order to determine the respective resistance of various road surfaces, and the relative values of wide and narrow tires, of different diameters of wheels, width of tread, together with the effect of grade and method of hitching on the effort that may be exerted by horses; also to determine the effect both on the draft required and on the road surface of increasing the load beyond certain limits.

*Scientific staff.*—Various members of the force of highway engineers, mechanical engineers, chemists, and student assistants in the office.

**Investigations of Rural Engineering Problems and Farm Structures.** E. B. McCORMICK, *Mechanical Engineer, in charge.*

These investigations involve the study of the domestic water supply and disposal of sewage on the farm; recommendations and plans for farm buildings and structures involved in rural improvement, with reference to convenience and economy; research, cooperative, and experimental demonstrations of rural problems involving an expert knowledge of mechanical principles; and instrument making and repair.

*Scientific staff.*—M. C. Betts, architect; A. M. Daniels and Elmer Johnson, assistant mechanical engineers; Wallace Ashby,\* M. A. R. Kelley, barn architects; W. R. Humpries, assistant in rural engineering; C. D. Haynes,\* G. L. Edick, architectural draftsmen; C. Kruegl, L. V. Lacy, architectural draftsmen; T. A. H. Miller, estimator; G. M. Warren, hydraulic engineer.

**Irrigation Investigations.** SAMUEL FORTIER, *Chief in charge of Irrigation Investigations.*

These investigations include the following subjects: Utilization of water in farm irrigation; pumping for irrigation; irrigation appliances and equipment; flow of water in ditches, pipes, and other conduits; measurement of water; customs, regulations, and laws relating to irrigation; drainage of irrigated lands; expert advice and assistance.

*Scientific staff.*—William L. Rockwell, Frederick C. Scobey, Clarence E. Tait, senior irrigation engineers; Samuel H. Beckett, Frederick L. Bixby, D. W. Bloodgood, F. W. Stanley, H. C. Diesem,\* A. L. Fellows, Chester G. Haskell, W. W. McLaughlin, J. C. Marr, Albert T. Mitchelson, Milo B. Williams, irrigation engineers; H. H. Kidder, M. R. Lewis, T. H. McCarthy,\* R. L. Parshall, Carl Rohwer,\* Reuben B. Sleight,\* assistant irrigation engineers; R. G. Hemphill, H. F. Blaney, Guy Ervin, junior irrigation engineers; Frank Adams, irrigation manager; William G. Sloan,\* drainage engineer for irrigation lands; Louis T. Jessup, assistant drainage engineer; Ray P. Teele, irrigation economist; P. A. Ewing, W. A. Hutchins,\* assistant irrigation economists; R. A. Hart, senior drainage engineer.

**Drainage Investigations.** S. H. McCRRORY, *Chief in charge of Drainage Investigations.*

These investigations embrace the following subjects: Methods of removing surplus water from lands having agricultural value; protection of lands from periodical overflow of streams; reclamation of tidal lands; control and conservation of rainfall on hillside lands; construction and maintenance of farm drainage works; equipment for use in constructing and maintaining farm drainage works; and costs and methods of organizing and financing community drainage projects.

*Scientific staff.*—Harry H. Barrows,\* Ora C. Baxter,\* George R. Boyd,\* F. C. Eason,\* J. R. Haswell,\* L. A. Jones,\* Roger D. Marsden, Dalton G. Miller, James V. Phillips, Charles E. Ramser, Fred F. Shafer, Perry T. Simons, David L. Yarnell, H. M. Lynde, senior drainage engineers; B. S. Clayton, Guy A. Hart, Edward C. Thomas, Charles Kirschner, F. E. Staebner, drainage engineers; Quincy C. Ayers,\* Albert O. Kay, Dan S. Helmick,\* A. L. Lane,\* Guy L. Smith,\* junior drainage engineers; W. B. Gregory, irrigation engineer; G. A. Mitchell, agent.

**BUREAU OF MARKETS.**

[Those whose names are starred (\*) are on furlough for military service.]

*Chief, CHARLES J. BRAND; Assistant Chief, HERBERT C. MARSHALL; Administrative Assistant in charge of operation, R. V. BAILEY; Librarian, CAROLINE B. SHERMAN; Assistant Librarian, MARY E. GRIFFITH; Chief Clerk, C. L. SNOW.*

The studies of the Bureau of Markets cover such subjects as: Market conditions, demand for specific crops; sources of supply; transportation and storage of farm products; methods of grading, standardizing, packing, and shipping farm products; the nature of the commercial transactions by means of which farm products move from the farm to the consumer; waste in marketing; methods of accounting and business practice for agencies marketing farm products; profits in handling farm products with means for the reduction of those which are excessive; and the cooperative association of farmers for marketing farm products, purchasing farm supplies, and for credit, social, or other improvement. Under regular appropriations an inspection service is conducted to determine the condition of fruits, vegetables, and butter, and reports are issued to show the amounts of certain food products held in cold storage. The Market News Services on Fruits and Vegetables and Live Stock and Meats have been greatly expanded with emergency funds, by the use of which the Bureau also issues market reports on dairy products, and on grain, hay, feeds, and seeds. Regulatory work is conducted in connection with the enforcement of the United States cotton futures act, the United States grain standards act, and the United States standard container act. The Bureau also is charged with the administration of the warehouse act, and the regulation of stock yards, and persons operating in or in connection therewith in accordance with the terms of the President's proclamation of June 18, 1918. Emergency food surveys are made by this Bureau, which also directs the purchase, distribution, and sale at cost of nitrate of soda to farmers.

**Cooperative Purchasing and Marketing.** O. B. JESNESS, *Assistant in Cooperative Organization, Acting in Charge.*

Under this project studies are made of the methods of organizing and operating cooperative marketing and purchasing associations. Specimen articles of incorporation, constitutions, and by-laws have been collected for the different kinds of marketing and purchasing organizations, and, where advisable, assistance is given to groups intending to organize.

*Scientific staff.*—J. M. Mehl, investigator in cooperative purchasing; F. S. Ruggles, investigator in cooperative marketing; Theo. Wade, investigator in cooperative organization.

**Market Surveys, Methods, and Costs.** WELLS A. SHERMAN, *Specialist in Market Surveys.*

Studies are made of the origin, movement, distribution, and consumption of market supplies of farm products, in order to accumulate and disseminate useful information

relating to all phases of the subject, including available and prospective production, movement of products into storage, the various agencies by and through which farm products are handled, distributed, stored, and sold, costs of doing business through existing market channels, and other matters. Questions relating to supply and demand for certain crops in specific markets, and the relation between prices and market supply and consumption are investigated.

Based upon mail reports of shipments received from practically all of the transportation lines in the country, statistics are compiled to show the number of cars of more than 80 perishable commodities shipped daily from each station in the country. Monthly reports of the cold-storage holdings of certain commodities are issued in cooperation with the project "Transportation and storage."

*Scientific staff.*—C. W. Kitchen, Paul Froehlich, J. H. Collins, and J. O. Bell, assistants in market surveys.

**Market Grades and Standards.** W. M. SCOTT, *Specialist in Fruit Grading and Standardization*, and C. T. MORE, *Specialist in Market Grades and Standards*.

To secure national uniformity in market grades, standards, weights, measures, packages, and trade names is the object of this work. It involves a careful study of present methods of grading and packing perishable products and of packages used and the development of improved methods and containers. Growers and shippers are encouraged to prepare their crops so that they may be efficiently and profitably marketed. Studies are made of the construction, equipment, and management of fruit and vegetable packing houses to determine the plans and methods best suited to various crops and conditions. The elimination of present wastes and losses caused by the faulty preparation of perishables for market is sought. Emergency work in grading and handling fruits and vegetables is described under "Emergency activities."

*Scientific staff.*—Hartley E. Truax,\* W. F. Allewelt, F. E. Parsons,\* and S. W. Shear,\* scientific assistants in marketing and distribution; Nathan Menderson,\* assistant in grades and standards; T. W. Ayres,\* E. F. McKune,\* F. G. Robb, S. H. Boddington, H. W. Samson, and W. H. Wicks, investigators in marketing; M. M. Stewart,\* assistant in market surveys; Manley Stockton, assistant in marketing fruits and vegetables.

**City Marketing and Distribution.** G. V. BRANCH, *Specialist in City Marketing*.

These investigations are carried on in many of the larger cities of the country. In studying the problems involved in supplying urban populations with perishable food stuffs, the possibilities of more direct, efficient, and satisfactory dealing through the medium of wholesale and retail public markets and wholesale terminal markets of various types are being investigated. The advantages of various other methods of city distribution are being studied and designs and estimates of the cost of model but economical market structures, fully equipped with modern facilities for the efficient and sanitary handling of food products are made. When local conditions warrant, and upon request of responsible organizations, market surveys are made and suggestions and general information given regarding possible improvements.

A local market reporting service has been developed in 15 large cities. This work is carried on largely under emergency funds. (See "Emergency activities.")

*Scientific staff.*—McFall Kerbey, assistant; Frank E. Chaffee, investigator in city marketing; William H. Darrow, scientific assistant in marketing and distribution.

**Transportation and Storage.** G. C. WHITE, *Specialist in Charge of Transportation*.

In this section commercial problems involved in the transportation and storage of farm products are investigated; the operation of special market trains and the development of boat service and of freight service by interurban electric lines are encouraged; the greater needs of producers and distributors are called to the attention of carriers; producers and shippers are impressed with their joint responsibility with carriers in the safe transportation of their products to market; shippers are urged to cooperate with carriers in alleviating car shortage by loading cars more heavily, by loading and unloading promptly, and by placing diversion orders at diversion points prior to the arrival of cars.

Complaints and appeals for assistance with respect to transportation which reach the Department are taken up with the railroads involved or with the office of the Director General of Railroads.

Data are secured relative to the quantity and kinds of foodstuffs held in storage and the length of time they are held. Costs of construction of storage plants, as well as operating costs and trade practices are studied, the information obtained in this connection being utilized in formulating laws governing the movement and prices of storage stocks. Data relative to the amount of commercial storage space available in the United States are compiled. In cooperation with the project, "Market surveys, methods and costs," monthly reports are issued regarding the cold-storage holdings of barreled and

boxed apples, butter, cheese, case and canned eggs, 25 kinds of frozen fish, 5 classes of poultry, and 6 kinds of meat and lard.

*Scientific staff.*—I. C. Franklin, specialist in storage; F. E. Matthews, assistant in cold storage methods and costs; W. M. Winter, specialist in transportation; E. R. Gassman, F. M. Patton, J. J. Stevens, I. N. Randall, W. H. Seidel, C. A. Forrest, C. J. Helber, J. G. Cross, J. E. Stubblefield, and C. E. Pierce, assistants in transportation.

**Direct Marketing.** LEWIS B. FLOUR, *Investigator in Marketing.*

Experiments are made to determine to what extent the parcel post and the services of the commercial express companies may be utilized profitably in marketing farm and nonmanufactured food products, from producer to consumer direct. Various types and makes of containers are being used in experimental shipments of nearly all classes of farm products, including extensive shipments of butter, eggs, fruits, and vegetables. Systems for bringing rural producers and urban consumers into contact and for establishing their business relationships on a proper basis are being worked out (see "Emergency Activities").

*Scientific staff.*—C. C. Hawbaker and Frank D. McClure, assistants in marketing by parcel post, and H. A. Spilman, assistant in direct marketing.

**Market Business Practice.**

The object of this work is to investigate the business practices of cooperative and farmers' marketing, distributing, purchasing, and rural business organizations and other marketing agencies, with special reference to their accounting systems and methods of auditing, business organization, and financing, and to devise suitable accounting systems for these organizations and agencies for the purpose of increasing their efficiency.

*Scientific staff.*—W. W. Wright, B. B. Mason, J. H. Conn,\* Geo. O. Knapp, A. E. Warner, L. H. Van Kirk, A. V. Swartout, C. I. Barfield, B. E. Corporon, and E. J. Way, assistants in market business practice; Frank Robotka, field agent in market business practice, State of Minnesota.

**Foreign Marketing Investigations.** C. W. MOOMAW, *Specialist in Foreign Marketing.*

Under this project investigations are made of foreign markets for American farm and nonmanufactured food products, and assistance is rendered wherever possible in developing export trade in such products. Investigations are made of the export facilities at the American seaboard and beyond, and methods and costs of physically handling farm and nonmanufactured food products intended for shipment abroad, trans-oceanic and foreign transportation, methods of distribution and sale in foreign countries, trade practices and preferences, and the various competitive factors encountered abroad by American producers and shippers.

Investigations are made also of the importation of farm and nonmanufactured food products and the influence of such imports on the domestic markets.

*Scientific staff.*—William R. Sibley, investigator in foreign marketing.

**Cotton Handling and Marketing.** FRED TAYLOR, *Cotton Technologist.*

This work includes the investigation of the commercial processes involved in handling, marketing, and utilizing cotton in order to make recommendations as to improvements and economies; the conduct of investigational and demonstrational work connected with the organization of communities of cotton growers to market their product; and experiments regarding the advantage of growing cotton from pure seed in these communities. Studies are made to determine the value to growers of grading cotton before sale and the relative commercial value of pure-bred varieties. Methods of ginning and compressing are studied, and primary market surveys are undertaken to determine the quality and variety and range of price of both long and short staple cottons. Cooperation is maintained with the various State officials in charge of the administration of State laws regarding the warehousing and marketing of cotton.

*Scientific staff.*—D. E. Earle, specialist in cotton marketing; J. G. Martin, investigator in cotton marketing; O. J. McConnell, specialist in cotton marketing; A. D. Hudson, assistant in cotton marketing; John B. Beers, assistant in cotton classing; N. T. Bringhurst, assistant in cotton grading; Reynolds Kohlheim, R. C. Banks, P. H. Hart, and C. T. Latimer, assistants in cotton classing.

**Cotton Warehousing Investigations.** R. L. NIXON, *Specialist in Warehousing.*

The purpose of this work is the accumulation and dissemination of useful information relating to the warehousing of cotton, insurance rates while in storage, and benefits, including better arrangements for financing, to be derived from conserving cotton in storage houses; the construction of different types of warehouses; and the relation of present methods and practices of compressing cotton to warehousing.

**Scientific staff.**—R. L. Newton, W. P. Daniel, and J. M. Workman, investigators in warehousing; James P. Brown, assistant in warehouse investigations; and F. G. Crout, scientific assistant.

**Marketing Cotton Seed and Its Products.** FRED TAYLOR, *Cotton Technologist.*

In this work investigations are made of present methods of handling, marketing, and utilizing cotton seed and its products, with a view to suggesting means whereby improvements may be made and economies effected, and studies are conducted regarding the establishment of standard grades and the standardization of conditions under which cotton seed and its products are handled and stored. Special attention is given to the consideration of moisture content as a factor in grading.

**Scientific staff.**—C. F. Creswell, investigator in marketing cotton seed and its products.

**Marketing Live Stock, Meats, and Animal By-products.** LOUIS D. HALL, *Specialist in Marketing Live Stock and Meats.*

A systematic study of existing live-stock markets and systems of marketing is in progress, including transportation facilities and agencies for the distribution of live stock, meats, and other animal by-products, and the marketing of pure-bred live stock. This involves an investigation of methods and costs of marketing live stock, meats, and other animal by-products through centralized markets and local agencies; a compilation of information relative to the centralized markets, their capacity, equipment, and characteristics; a study of market classes and grades at the different points; and the collection and distribution of information relative to current market supplies and prices of live stock, meats, and other animal by-products. The marketing of wool is being studied, and reports dealing with the supply and consumption of wool are issued.

**Scientific staff.**—T. R. H. Wright, assistant in marketing live stock and meats; L. B. Burk, investigator in marketing live stock and meats; C. V. Whalin, A. G. Bovay, M. Y. Griffin, C. E. Brashears, assistants in marketing live stock and meats; G. T. Willingmyre, specialist in marketing wool; H. W. Metzger,\* investigator in wool warehousing; W. M. Buck, assistant in marketing wool; A. D. Knox, field agent in live-stock marketing.

**Marketing Dairy Products.** ROY C. POTTS, *Specialist in Marketing Dairy Products.*

In this work field surveys and investigations are made of the marketing of dairy products and dairy substitutes, including methods and costs of their preparation for market, market grades and classification, market quotations and quotation systems, selling agreements, marketing facilities and methods, market supplies, requirements and conditions, producers' problems and related subjects in order to suggest measures by which market conditions and marketing methods may be improved, and costs of marketing dairy products reduced. (For description of market news service on dairy products see "Emergency Activities.")

**Scientific staff.**—Leon M. Davis, G. P. Warber, Warren H. Barber, Delos L. James, Walter H. Grell, John B. McCready, Alexander C. Dingwall, and C. W. Fryhofer, assistants in marketing dairy products.

**Grain and Hay Marketing Investigations.** GEORGE LIVINGSTON, *Specialist in Grain Marketing.*

A detailed economic study of the primary and terminal marketing of grain and hay and the marketing of such commodities to the consuming public is now in progress. This study, which includes cost of marketing, storage, warehouse practices, mixing, scalping, future trading, and other phases of the subject, is being made in order to obtain information useful to the various agencies engaged in the marketing and distribution of grain and hay, and for the purpose of offering constructive suggestions for improvement in marketing and distributing these products.

**Scientific staff.**—Charles S. Cole, investigator in rural organization, and Vernon P. Butler, grain supervisor.

**Seed Marketing Investigations.** W. A. WHEELER, *Specialist in Seed Marketing.*

The purpose of this work is to investigate the marketing of field and vegetable seeds by growers, shippers, and dealers. A study is being made of the methods of marketing now followed, with a view to suggesting improvements in such methods, both to seed growers and dealers. Studies of methods of cleaning seeds, kinds of cleaning machinery used, and methods of keeping records of seed stocks by seedsmen are being made. Investigations are made relative to prices received by producers and paid by consumers, and of the factors affecting supply and demand.

**Scientific staff.**—G. C. Edler, investigator in seed marketing; S. S. Lawrence and G. F. Kellogg, assistants in seed marketing; and V. P. Fawcett, scientific assistant.

**Preservation of Fruits and Vegetables in Transit and Storage.** H. J. RAMSEY, *Pomologist in Charge.*

These investigations are made to encourage careful and efficient methods of handling, shipping, and storing fruits and vegetables so as to render them less liable to deterioration and decay in storage and in transit and to insure their arrival on the market in sound condition.

The efficiency of refrigerator cars and equipment used in transportation, as affecting the condition of perishables in transit and on arrival at market terminals, and the relation of precooling and icing practices and methods of loading to the successful transportation of these products are investigated. The influence of temperature and humidity to the keeping quality of fruits and vegetables in refrigerated or common storage and the construction and functioning of storage warehouses are studied in this project. Certain phases of these investigations are conducted in cooperation with projects in the Bureau of Plant Industry carrying on closely related work. Emergency work conducted by this project is described under "Emergency Activities."

*Scientific staff.*—C. W. Mann, pomologist; A. W. McKay, specialist; S. J. Dennis, refrigeration technologist; Edwin Smith,\* L. W. Collins, George L. Fischer,\* C. S. Pomeroy, K. B. Lewis,\* and D. B. Carrick, investigators; F. W. Allen, assistant horticulturist; V. W. Ridley,\* W. C. Quick, A. F. Edminster,\* C. E. Schuster,\* H. Graff, J. R. Magness,\* A. E. Nelson,\* V. G. Gibson, S. H. Davidson,\* E. W. Montell,\* H. F. Smith,\* scientific assistants; H. C. Albin, E. B. Benson,\* assistants in marketing; O. E. Simpson,\* assistant in market surveys.

**Collecting and Distributing Market Information on Fruits and Vegetables.**

WELLS A. SHERMAN, *Specialist in Market Surveys.*

A telegraphic market news service covering the commercial movement and prevailing market prices of the principal fruit and vegetable crops is given. Branch offices have been established in the principal metropolitan markets, and these, in connection with temporary offices located in producing territory during crop movement, act as centers for the distribution of all available information. The information which is made public includes reports from all important markets covering receipts, market conditions, and prevailing wholesale prices; telegraphic advices from railroad officials in all parts of the country, giving shipments of the commodities which are being reported; and f. o. b. information furnished by field men in shipping areas. During the major portion of the year daily bulletins are issued from the permanent city offices and from the various temporary offices in commercial producing territory. This work has been much extended by the use of emergency funds (see "Emergency Activities").

*Scientific staff.*—O. W. Schleussner, specialist in marketing perishable products; H. B. Daly, George B. Fiske, D. W. Hadsell, W. E. Harrison, C. W. Heard, Benjamin Jelinek, W. P. Johnson, A. D. Miller, Lee R. Miller, P. J. Roach, W. O. Smith, jr., H. H. Warner, investigators in marketing fruits and vegetables; R. L. Ringer, investigator in market surveys; B. C. Boree, T. C. Bushfield, L. J. Case, Saxon D. Clark, Minnie D. Davis, George E. Engels, A. D. Gail, jr., H. A. Harris, B. B. Jones, F. R. Keebler, C. W. Kitchen, O. J. McDonald, L. H. Martin, H. E. Munger, W. H. Mosier, F. W. Read, E. M. Seifert, jr., W. M. Stevens, E. W. Stillwell, W. G. Thompson, Lucy Watt, M. S. Wiggins, assistants in market surveys; J. J. Ahearn, George C. Bayley, George S. Black, Lorain H. Brown, Ralph A. Ely, J. T. Glass, W. H. Hall, C. J. Hansen, J. H. Hoover, Willis C. Russell, Roy S. Schell, J. H. Thomas, P. M. Williams, assistants in marketing fruits and vegetables; Dudley Alleman, Daniel C. Rogers, scientific assistants; E. R. Biddle, J. K. Boyd, F. M. Kern, R. S. Lumbard, F. D. McNulty, W. H. Stanton, B. E. Yaden, market station assistants; E. J. Ransick, assistant in marketing perishable products; Harold J. Clay, Elbert E. Conklin, jr.,\* Carroll W. Dunning,\* Walter Kingsbury, James P. Klein, Albert E. Lindquist,\* J. William Park,\* Clifford R. Runyan, R. H. Shoemaker, assistants in market surveys; R. Maynard Peterson, investigator in market surveys; Martin L. Henry,\* Albert E. Mercker, investigators in marketing; Rodolphus Kent,\* scientific assistant in marketing and distribution; Joseph N. Else,\* George M. Meyer,\* assistants in marketing.

**Market Reports on Live Stock and Meats.** LOUIS D. HALL, *Specialist in Marketing Live Stock and Meats.*

These reports are divided into nine classes: (1) Daily market reports on meat trade conditions which show prices, supply, demand, and trend of the market for beef, veal, pork, pork products, lamb, and mutton in Boston, Chicago, Los Angeles, New York City, Philadelphia, Pittsburgh, Washington, and San Francisco; (2) Daily market reports on live stock at Chicago, showing prices, receipts, demand, and trend of the market for cattle, hogs, and sheep; (3) Daily reports on live stock loaded the day previous classified by destinations and tabulated by State origins for all the principal market centers; (4) Weekly summary of meat trade conditions and prices which is issued every Saturday morning; (5) Weekly live stock and meat trade news report issued every

Thursday morning, which contains special items relating to live-stock and meat trade conditions; (6) Monthly reports of receipts of live stock by classes at stock yards; (7) Reports showing monthly shipments of stockers and feeders, cattle, sheep, and hogs; (8) Reports showing total shipments of live stock from markets; and (9) Monthly reports showing the local slaughter at markets as determined by the difference between total receipts and total shipments. These reports are issued as soon after the first of each month as possible.

*Scientific staff.*—W. C. Davis, C. A. Burmeister, S. Bray, Jos. K. Campbell, W. E. Doble, S. W. Doty, S. H. Ray, W. O. Ellis, D. J. Slater, E. V. Baker, C. E. Gibbons, R. E. Reynolds, E. E. Nicolls, F. P. Allen, C. M. Pipkin, J. K. Wallace, A. B. Smeby, E. W. Baker, W. C. Phillips, E. H. Schroer, D. W. Compton,\* J. C. Holmes, E. K. Hess, J. L. Roth, C. Bruce, O. J. Thompson, E. S. Kennedy, C. H. Beauchamp, Earle P. Brooks, and Jess T. Morris,\* assistants in marketing live stock and meats; B. M. Mace, jr., assistant in marketing live stock; J. H. Peters, D. L. Swanson,\* L. I. Weil,\* H. P. Morgan, J. A. Burgess, B. G. Hays, G. R. Scott,\* L. W. Mints, and L. B. Mann, scientific assistants in marketing live stock and meats; C. M. Harris,\* E. T. Deibel, and C. A. Neff, market assistants.

**Food Supply Investigations.** CHARLES S. COLE, *Investigator in Rural Organization*; LOUIS D. HALL, *Specialist in Marketing Live Stock and Meats*; GEORGE LIVINGSTON, *Specialist in Grain Marketing*.

In this work, which is carried on in cooperation with the Federal Trade Commission, effort will be made to show the character and cost of the services rendered and the profits received by various agencies handling farm products. If undue profits appear to be made by any factor or factors effort will be made to determine whether they are the result of unhindered economic laws or of manipulation and artificial control. Special attention is being paid to live stock and meats and the principal grains entering into food.

*Scientific staff.*—Vernon E. Butler, specialist in grain-exchange practice; James E. Boyle and William F. Logan, assistants in food-supply investigations; Charles V. Whalin and Turner R. H. Wright, assistants in marketing live stock and meats.

**Market Inspection of Perishable Foods.** W. M. SCOTT, *Specialist in Fruit Grading and Standardization*; C. T. MORE, *Specialist in Market Grades and Standards*; and ROY C. POTTS, *Specialist in Marketing Dairy Products*.

This inspection service was inaugurated November 1, 1917. Inspectors are maintained at the principal markets to investigate and certify to shippers and other interested parties the quality and condition of fruits and vegetables and butter upon arrival at these markets. The object of this service is to establish an unbiased basis for the adjustment of differences among growers, shippers, wholesalers, and transportation companies, and to conserve the supply of the products affected by facilitating the movement and sale of these products.

*Scientific staff—Fruits and vegetables.*—E. L. Markell, supervising inspector, Northeastern Division, New York; W. F. Allewelt, scientific assistant in marketing and distribution; E. F. McKnne,\* J. M. Mosher, S. H. Boddinhouse, C. E. Merrill,\* F. T. Curry\* and W. V. Stephens,\* inspectors of fruits and vegetables; O. C. Schleussner and H. C. Hetzel, supervising inspectors; R. C. Butner, W. C. Hackleman,\* A. L. Williams, G. W. Payne, S. F. Shreve, L. J. Weishaar, F. J. Bachler, F. H. Lister, F. A. L. Bloom, W. G. Thompson, Geo. E. Engles, L. J. Case, C. F. de Souchet, W. M. Rash, S. C. Vandenburg, Myron S. Foster, Chas. D. Shirley, Paul W. Barnes, C. H. Heard, O. J. McDonald, V. V. Westgate, W. H. Beckham, John M. Rogers, H. A. Arenz, D. W. Hadsell, J. N. Jordan, H. H. Warner, J. H. Hoover, John W. Law, Fred S. Kinsey, C. M. Davidson, H. H. Henderson, Frederick Wolforth, H. M. Conolly, B. Jones, F. G. Robb, James A. Marks, R. L. Ringer, W. H. Wicks, H. W. Samson, Manley Stockton, inspectors, and others to be appointed.

*Dairy products.*—C. W. Fryhofer, John B. McCready, Walter H. Grell, Leon M. Davis, and A. C. Dingwall, assistants in dairy marketing.

**Investigations and Demonstrations of Cotton Standards.** FRED TAYLOR, *Cotton Technologist*.

Under this head are made field and laboratory investigations and demonstrations of standards for the different grades, qualities, and conditions of cotton. Investigations are carried on regarding the ginning, grading, stapling, baling, marking, compressing, and tare of cotton. Studies are made relative to standardizing Arizona-Egyptian cotton, the length of staple of cotton, cotton of perished staple or immature staple, and gin-cut cotton, reginned cotton, and cotton linters. When practicable, grading experts demonstrate the use of the official standards to communities of cotton growers, in order to secure more uniform grading in connection with spot cotton transactions and to promote the use of the official cotton standards of the United States.

*Scientific staff.*—George Butterworth, specialist in cotton classing; J. G. Martin, investigator in cotton marketing; Frank E. Devine and George Howland, assistants in cotton classing; H. B. Richardson, assistant in agricultural technology.

**Cotton Testing.** FRED TAYLOR, *Cotton Technologist.*

Under this project tests are made of the waste, tensile strength, and bleaching qualities of the different grades, classes, and varieties of cotton in order to determine their commercial and spinning values. Spinning tests are being conducted on the basis of the official cotton standards of the United States, representing cotton of upland, Texas, and Gulf growths, with staple approximately fifteen-sixteenths of an inch long purchased from representative sections of the cotton belt. The official grades of American Egyptian and Sea Island cotton are also being tested, in cooperation with the War Department, with a view to determining the class of cotton and fabric construction best suited for airplane and balloon cloth.

*Scientific staff.*—Fred Taylor and D. E. Earle, supervisory committee; C. E. Killingsworth and George W. Howland, assistants in cotton classing, and H. B. Richardson assistant in agricultural technology.

**Rural Credit, Insurance, and Communication.** C. W. THOMPSON, *Specialist in Rural Organization.*

This work consists of the investigation and the encouragement of organization in rural communities for the purpose of obtaining better credit, insurance, and communication facilities. This includes a study of the conditions under which farmers obtain loans or credit; a study of successful organizations performing the functions of rural-credit banks; the promotion of organized activity among farmers for credit improvement; the elimination of disastrous losses to farmers by the encouragement of cooperative effort in providing proper insurance facilities and in safeguarding the property against loss; and the study of various methods of securing rural telephone service and the encouragement of cooperation for this purpose.

*Scientific staff.*—V. N. Valgren, investigator in agricultural insurance; and Leon E. Truesdell, field assistant in rural organization.

**Rural Social and Educational Activities.** C. W. THOMPSON, *Specialist in Rural Organization.*

The object of this work is the improvement of social and educational conditions in rural communities by the accumulation and dissemination of useful information growing out of a study of the social and educational needs of typical communities, the work of their existing forms of organization, and the possibilities for improvement through organized activity. Methods of encouraging social organization activities are investigated, and study of means of improving social, economic, and educational conditions of women and children through the work of women's rural organizations is made.

*Scientific staff.*—Leon E. Truesdell and Wayne C. Nason, assistants in rural organization.

**State Cooperation in Marketing Work.** J. C. SKINNER, *Specialist in charge.*

The object of this work is to carry on in cooperation with the various State agricultural colleges and departments of agriculture investigational and demonstrational work in connection with the marketing and distributing of farm products. Field agents in marketing are located in each of the cooperating States, such agents having charge of the marketing investigations and demonstrations conducted within that State.

*Scientific staff.*—In Washington, D. C., R. H. Elsworth, and B. C. Moomaw, jr.,\* assistants in State cooperation in marketing work; and Cornelia P. Lyne, administrative assistant, State cooperation in marketing work. Arkansas, J. H. Tull; Colorado, S. L. Sweet and Edwin L. Sewell; Connecticut, Guy C. Smith; Georgia, M. C. Gay; Indiana, J. R. Cavanagh; Iowa, L. G. Foster and C. M. Beem; Michigan, Hale Tennant; Minnesota, Frank Robotka; Mississippi, H. L. Pate, John F. McKay, and Thomas M. Patterson; Montana, W. L. Beers; Nebraska, H. C. Filley and M. E. Wade; New Mexico, Charles A. McNabb; North Carolina, W. R. Camp and Charles S. Jones; Ohio, V. H. Davis and William F. Rofkar; Oregon, Hector Macpherson; Tennessee, C. E. Brehm; Texas, Howard M. Elliot; Vermont, Mogens R. Tolstrup; Washington, Asher Hobson, James L. Dumas, and Joseph Passonneau.

**Investigation and Determination of Grain Standards.** J. W. T. DUVEL,\*\* *Crop Technologist* and S. A. REGAN, *Grain Supervisor, Acting in charge.*

Investigations are made of such phases of harvesting, handling, transportation, cleaning (including the removal of smut at time of threshing), storage, and grading of grain as contribute information fundamental and necessary for establishing, fixing, and

\* On temporary leave of absence, with Food Administration.

perfecting standards for corn, wheat, rye, oats, barley, grain sorghums, flaxseed, rice, and such other grains as the usages of the trade may warrant and justify; investigations are made of the relations of grades and standards to the feeding and manufacturing value of sound and unsound grain; also of the influence on grade of biophysical, biochemical, and physiological changes which take place in grain during harvesting, transportation, and storage. Laboratory methods for determining the condition and quality of grain are developed and perfected, as is special apparatus for use in grain grading.

*Scientific staff.*—J. H. Cox and J. D. Morgan, grain supervisors; W. L. Stockham and F. B. Wise, specialists in grain standardization; G. H. Baston and P. J. Böllman, assistant grain supervisors; C. H. Bennett, C. C. Ruth, and G. A. Stuart, assistants in grain standardization; F. E. Allison,\* L. L. Andrews,\* R. L. Baldwin, Dr. D. A. Coleman,\* H. E. Earp,\* W. L. Frank, C. M. Fritz, W. K. Marshall,\* A. R. Matters,\* and H. B. Musser, scientific assistants; E. N. Bates, investigator in grain dockage; J. K. Hayes, assistant in grain marketing.

**Grain Handling and Transportation Investigations.** J. W. T. DUVEL,\*\* *Crop Technologist*; GEORGE LIVINGSTON, *Specialist in Grain Marketing*; and S. A. REGAN, *Grain Supervisor, Acting in charge*.

Investigations of general and specific commercial problems connected with the handling, transportation, and storage of grain are conducted, including methods employed on the farm, at the country elevator, and at distributing and consuming centers; the effect of commercial practices on the commercial value of grain; the relation of transportation facilities to the economic and efficient marketing and distribution of grain in domestic and foreign commerce; the construction and equipment of elevators and warehouses and of such other related subjects as may furnish information useful to the various agencies engaged in the handling, transportation, storage, and merchandising of grain.

*Scientific staff.*—A. L. Rush, grain supervisor; O. Shattuck, scientific assistant; E. Chenault, assistant in grain marketing; A. R. Evans,\* assistant in seed marketing; J. N. Arndt, investigator in grain dockage.

**Enforcement of Standard Container Act.** CHARLES J. BRAND, *Chief of Bureau*.

The enforcement of the provisions of the standard container act and the regulations of the Secretary of Agriculture thereunder is carried on under this project together with the necessary investigational work.

*Scientific staff.*—C. T. More, specialist in market grades and standards; W. M. Scott, specialist in fruit grading and standardization; F. P. Downing, investigator in marketing.

**Milling Investigations for the Purpose of Establishing and Revising Grades for Wheat and Other Grains.** HERBERT C. MARSHALL, *Assistant Chief of Bureau*; GEORGE LIVINGSTON, *Specialist in Grain Marketing*; and J. H. SHOLLENBERGER, *Grain Supervisor*.

The object of this work is to investigate the milling and baking qualities of wheat and other grains for the purpose of determining the relation of various factors, such as test weight per bushel, gluten content, color, texture, general appearance, different forms of damage, mixtures of different kinds and qualities of the same grain and of different grains, admixtures of various impurities, various treatments to which grain is subjected in commercial handling, storing, and milling to intrinsic values, for the purpose of establishing and revising grades for these grains.

**Enforcement of the United States Cotton Futures Act.** CHARLES J. BRAND, *Chief of Bureau*; D. S. MURPH, *Specialist in Cotton Marketing and Warehousing*; FRED TAYLOR, *Cotton Technologist*; and GEORGE R. ARGO, *Specialist in Cotton Business Methods*.

Supervision and direction of the investigational and regulatory activities of the Bureau of Markets in connection with the enforcement of the United States cotton futures act and the rules and regulations of the Secretary of Agriculture thereunder, and such executive and clerical duties as may be necessary in connection therewith are carried on under this project.

**Determination of Disputes under the United States Cotton Futures Act.** GEORGE R. ARGO, *Specialist in Cotton Business Methods*.

The object of this work is to hear and determine disputes as to the classification of cotton tendered in settlement of future contracts made in compliance with sections 5 and 6A of the cotton futures act, and referred to the Secretary of Agriculture under the terms of the act, and to prepare findings of the Secretary.

*Scientific staff.*—R. L. Francis, George Butterworth, and A. M. Agelasto, specialists in cotton classing; H. C. Slade, assistant in cotton marketing.

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\*\* On temporary leave of absence, with Food Administration.

**Investigation of Future and Spot Markets for Cotton under the United States Cotton Futures Act.**—GEORGE R. ARGO, *Specialist in Cotton Business Methods.*

Under this head investigations are made of future markets for cotton to ascertain how accurately their future quotations reflect spot values, and to secure general information as to conditions within the future exchanges; markets are studied to determine their fitness for designation as bona fide spot markets; quotations are secured daily from each of the designated spot markets; and the markets are inspected from time to time to see that they conform to the necessary conditions.

*Scientific staff.*—F. W. Knight, specialist in cotton classing.

**Preparation and Distribution of the Official Cotton Standards of the United States under the United States Cotton Futures Act.** FRED TAYLOR, *Cotton Technologist.*

In this section is done the work of preparing and distributing the official cotton standards of the United States; of inspecting and condemning these standards when necessary; and replacing them upon request.

*Scientific staff.*—D. E. Earle, specialist in cotton marketing; H. C. Slade, assistant in cotton marketing; R. L. Kause, L. T. Rhea, H. A. Pitner, L. A. Austin, E. C. Seifert, G. P. Taylor, and C. T. Latimer, assistants in cotton classing.

**Enforcement of the United States Grain Standards Act.** CHARLES J. BRAND, *Chief of Bureau, assisted by GEORGE LIVINGSTON, Specialist in Grain Marketing.*

Supervision and direction of the investigational and regulatory activities involved in the enforcement of the United States grain standards act, and the rules and regulations of the Secretary of Agriculture thereunder and such executive and clerical duties as may be necessary in connection therewith are carried on under this project.

*Scientific staff.*—John F. Wilmeth, administrative assistant; C. B. Barron, E. G. Boerner, W. P. Carroll, Laurel Duval, R. T. Miles, E. L. Morris, Philip Rothrock, H. J. Besley, Walter Fowler, H. A. Martin, R. E. Smith, F. L. Wallace, C. L. Cannon, R. C. Miller, C. A. Russell, B. J. Stubblefield, B. W. Whitlock, J. M. Chilton, J. H. Edwards, C. G. Franks, R. D. Jarboe, O. F. Phillips, H. H. Gear, Wm. J. O'Loughlin, R. H. Brown, L. Gallaher, E. J. Hickey, J. Sheedy, F. L. Loos, W. H. McDonald, R. C. Mill, R. R. Saunders, F. G. Smith, R. B. Woolsey, J. A. LeRoy, J. T. Cavanagh, H. B. Evans, E. H. Linzee, H. A. Rhoades, E. Keiser, J. C. Kerr, E. C. Noll, C. F. Standring, H. L. Binkley, H. Anderson, G. K. Landers, W. H. McMurtrey, and J. H. Frazier, grain supervisors; P. J. Brittain, specialist in grain exchange practice; A. W. Herger, E. J. Murphy, assistants in grain supervision; J. R. Mathewson, assistant in marketing grain; E. A. Hill, C. B. Wright, R. C. Wright, A. F. Nelson, W. F. Shanahan, R. W. Taylor, F. A. Cummings, C. J. Fink, H. F. Gray, J. F. MacKenzie, A. G. Roesser, W. J. Morgan, J. B. Wallace, assistant grain supervisors.

**Appeals and Inspection Procedure under the United States Grain Standards Act.** E. G. BOERNER, *Grain Supervisor.*

Appeals from inspections and gradings of grain sold, offered for sale, or consigned for sale by grade, and shipped or delivered for shipment in interstate or foreign commerce, and disputes as to the grade of grain sold, offered for sale, or consigned for sale by grade and shipped or delivered for shipment in interstate or foreign commerce, without inspection under the provisions of the act, are determined and the findings in each case prepared and issued.

*Scientific staff.*—Clifford G. Franks and W. J. O'Loughlin, grain supervisors.

**Inspection Efficiency.** H. J. BESLEY, *Grain Supervisor.*

Supervision of the inspection of grain in order to secure the correct and uniform application of the official grain standards of the United States; to cause examinations to be made of any grain which has been shipped or delivered for shipment in interstate or foreign commerce when sold, offered, or consigned for sale by grade or which has been graded by a licensed inspector, for the purpose of determining whether it conforms to the standard of the grade specified; to supervise the keeping of all records of grain graded and inspected by licensees under the act, the collection of reports and the compilation for publication of the summary of facts required by section 7 of the act.

*Scientific staff.*—J. M. Chilton, grain supervisor; Laurel Duval, Clark A. Russell, Oscar F. Phillips, Philip Rothrock, E. L. Morris, B. J. Stubblefield, division supervisors.

**Licensing and Violations under the United States Grain Standards Act.**

A. W. HERGER, *Assistant in Grain Supervision.*

The object of this work is to determine the competence of persons applying for license to inspect and grade grain under the provisions of the United States grain standards

act, and to issue to qualified persons licenses to inspect and grade grain and to certificate the grade thereof. Licenses are suspended or revoked for cause, in accordance with the provisions of the act.

*Scientific staff.*—Fred G. Smith, grain supervisor; E. J. Murphy, assistant in grain supervision; J. A. Bergen, assistant in marketing grain; and Henry Evans, grain supervisor.

**Administration of the United States Warehouse Act.** CHARLES J. BRAND, *Chief of Bureau*; D. S. MURPH, *Specialist in Cotton Marketing and Warehousing*; and R. L. NIXON, *Specialist in Warehousing*.

The purpose of this work is to inspect and classify warehouses applying for licenses under the United States warehouse act; to license warehouses that are found to be suitable for the proper storage of cotton, grains, flaxseed, wool, and tobacco; to license weighers and graders desiring to weigh and grade agricultural products to be stored in warehouses licensed under this act; to license any person not a warehouseman to accept custody of cotton, grains, flaxseed, wool, and tobacco, and to store same in a warehouse owned or operated by any State; to prescribe the duties of warehousemen licensed by the Secretary of Agriculture, to make rules and regulations for carrying out the provisions of the United States warehouse act, and to prescribe the conditions of the bond required of licensed warehousemen; to investigate the storage, warehousing, classifying, according to grade or otherwise, weighing and certification of cotton, grains, flaxseed, wool, and tobacco; to establish and promulgate standards for agricultural products by which their quality or value may be judged or determined; and to make such other investigations as may be necessary for carrying out the provisions of the United States warehouse act.

*Scientific staff.*—R. L. Newton, J. M. Workman, and H. K. Holman, investigators in warehousing; J. P. Brown, R. B. Smith, S. G. Hilton, and T. L. Hughes, assistants in warehouse investigations; F. G. Cront, scientific assistant.

#### Emergency Marketing Work.

**Market News Service on Fruits and Vegetables.** WELLS A. SHERMAN, *Specialist in Market Surveys*.

This work is an extension of that conducted under the project "Collecting and Distributing Market Information on Fruits and Vegetables." With funds made available under the Food Production Act, twenty permanent market stations and about forty-two temporary field stations are maintained, in addition to the twelve permanent market stations and forty temporary field stations opened before the emergency appropriation became available.

*Scientific staff.*—See "Collecting and Distributing Market Information on Fruits and Vegetables."

**Market News Service on Live Stock and Meats.** L. D. HALL, *Specialist in Marketing Live Stock and Meats*.

This is an amplification of the work under "Market Reports on Live Stock and Meats." With emergency funds, offices have been opened in fifteen additional market centers, and it has been possible to furnish the public with more complete information regarding the live stock trade. About 550,000 of the total 750,000 market reports which are distributed each month have been issued by use of emergency funds.

*Scientific staff.*—See "Market Reports on Live Stock and Meats."

**Market News Service on Dairy and Poultry Products.** ROY C. POTTS, *Specialist in Marketing Dairy Products*.

The market news service on dairy products includes the collection and publication of data regarding the amount of manufactured milk products produced in the United States, market receipts, market supplies, including storage movement, storage stocks, and current trading stocks in the hands of wholesale and jobbing distributors, prices of dairy products, and information in regard to market conditions which may be of value to producers, distributors, and consumers in intelligently directing their sales and purchases of dairy products.

*Scientific staff.*—Leon M. Davis, G. P. Warber, Walter H. Grell, John B. McCready, A. C. Dingwall, Leon E. Gaylord, O. W. Holmes, Clarence L. Pier, Albert B. Loring, Ray C. Bish, Frank H. McCampbell, H. S. Baird, and Mima Ridiford Pollitt, assistants in marketing dairy products.

**Grain and Hay Market Reporting Service.** GEORGE LIVINGSTON, *Specialist in Grain Marketing*.

This project is at present conducting a market news service covering the commercial movement of the principal grains and hay, stocks on hand, and the prevailing market prices of such commodities. In order to expedite the dissemination of these reports the

country has been divided into seven divisions, and reports for each division are issued from its headquarters. The information which is made public includes reports of stocks on hand, prospective receipts and shipments, and prices for grains in all sections. Special reports are also issued from time to time dealing with particular phases of the marketing of these crops.

*Scientific staff.*—Wm. M. King, assistant in grain marketing; H. L. Bowen, investigator in grain marketing; C. P. Martin, investigator in hay marketing; G. B. Alguire, A. Rickles, Louis D. Todd, G. C. Wheeler, Earl Chenault, and G. A. Collier, assistants in grain marketing; W. C. Farrell, assistant in hay marketing; A. R. Evans, assistant in seed marketing; R. B. Smith, assistant in warehouse investigations—grain.

**Seed Reporting Service.** W. A. WHEELER, *Specialist in charge, Seed Reporting Service.*

This service was organized to give seed growers, shippers, and dealers information regarding the seed-crop movement, receipts and shipments of seeds in large markets, available supply of seeds in hands of growers and dealers, factors indicating probable demand for seeds, trend of prices, reports of qualities of seed due to unfavorable weather conditions or other factors, etc.

Information is obtained for use by governmental agencies and the public in making preparations for increasing production and in promoting the efficient distribution of seeds and conserving the seed supply.

A monthly publication, the *Seed Reporter*, is the official organ of the Seed Reporting Service and is distributed regularly to seed dealers, shippers, and growers, and to others on request.

*Scientific staff.*—G. C. Edler and W. O. Whitcomb, investigators in seed marketing; C. F. Kellogg, S. S. Lawrence, J. E. Barr, and J. W. Bedford, assistants in seed marketing; V. P. Fawcett, scientific assistant; J. W. Dykes, clerk, in charge field station.

**Emergency Food Surveys.** CHARLES J. BRAND, *Chief of Bureau*; C. W. THOMPSON, *Leader of Project, assisted by committee composed of* HERBERT C. MARSHALL, *Assistant Chief of Bureau*; W. A. SHERMAN, *Specialist in Market Surveys*; W. A. WHEELER, *Specialist in Seed Marketing*; and G. V. BRANCH, *Specialist in City Marketing*.

These surveys are being undertaken to secure information regarding the food supply of the Nation, especially the quantity of various important food commodities in the hands of producers, dealers, and other agencies, the relative supply as compared with that of a year ago, and the rate of consumption. Cooperative work is done with the Office of the Secretary to obtain information regarding the supply and prices of fertilizer materials in the United States.

Surveys have been made of the quantities of raw food products on farms, stocks in the hands of manufacturers, storage concerns, wholesale and retail dealers; and household stocks and household consumption.

**Conservation of Food Products in Transportation and Storage.** H. J. RAMSEY, *Pomologist.*

This work involves such matters as the demonstration of the amount of decay and deterioration of fruits and vegetables due to (a) delays prior to shipment, in transit, and at terminals; (b) faulty methods of storing in cars; (c) improper containers; (d) unnecessarily long hauls; (e) inefficient refrigerator-car construction; (f) too-long storage; (g) ill-adapted types of storage, and similar matters. Corrective measures are applied whenever possible.

Specialists in harvesting and handling fruits and vegetables conduct demonstrational work in producing sections, and advice is given to producers regarding the proper construction of storage houses and other matters. Carriers are urged to use heater and refrigerator cars of the most efficient type.

*Scientific staff.*—C. W. Mann, pomologist; A. W. McKay, specialist; S. J. Dennis, refrigeration technologist; R. R. Pailthorp, L. W. Collins, H. S. Bird, J. W. Andrews, R. G. Ifill, H. E. Waterbury, C. S. Pomeroy, D. B. Carrick, H. A. Jones, and L. F. Boyle, investigators; R. C. Wright, assistant physiologist; F. W. Allen, assistant horticulturist; W. C. Quick, H. Graff, H. V. DeMott, V. G. Gibson, and Harry Duffield, scientific assistants; H. C. Albin, George W. Baker, F. L. Harkey, W. P. Thompson, and J. F. Ryan, assistants in marketing; E. A. Miller, Oscar Barber, E. E. Atkinson, F. J. Godin, H. H. Kemp, R. O. Stough, D. M. Scott, A. K. Short, and J. G. Woodruff, assistants in sweet-potato storage demonstrations.

**Emergency Traffic and Storage Assistance.** G. C. WHITE, *Specialist in charge of Transportation.*

This work is an extension of regular activities and is conducted to render assistance in solving transportation problems brought about by war conditions.

*Scientific staff.*—(See "Transportation and Storage.")

**Market Inspection of Perishable Foods.** W. M. SCOTT, *Specialist in Fruit Grading and Standardization*; C. T. MORE, *Specialist in Market Grades and Standards*; and R. C. POTTS, *Specialist in Marketing Dairy Products*.

This work is an extension of similar activities conducted under regular funds. *Scientific staff*.—(See "Market Inspection of Perishable Foods" under regular activities.)

**City Market Reporting Service.** G. V. BRANCH, *Specialist in City Marketing*.

As mentioned under "City Marketing and Distribution," a local market reporting service has been developed in 15 of the larger cities and is gradually being extended as conditions warrant. Bureau representatives cover local markets thoroughly, securing receipts and prices to retailers of locally grown produce offered by public farmers' markets and wholesale and commission merchants. This information is given to near-by growers through mailed bulletins. By special arrangements with newspapers the consuming public is kept closely informed of market conditions and the prices which retailers pay for their supplies. In several cities a fair price list is published in conjunction with the information mentioned above. Where this is done it is through cooperation with local food administrators.

*Scientific staff*.—McFall Kerbey, W. H. Darrow, and Harvey E. Larsen, assistants; A. Presby Colburn, H. S. Schwenk, and H. L. Russell, scientific assistants in marketing; R. B. Grabill and E. J. Maynard, assistants in marketing fruits and vegetables; M. A. Russell, and Dano O. Merrill, scientific assistants in marketing and distribution; Dolph Berli, investigator in marketing fruits and vegetables; George W. Porter, B. W. Sherburne, G. M. Stack, and Harry Campbell, agents.

**Direct Market Activities.** LEWIS B. FLOHR, *Investigator in Marketing*.

Assistance is given, so far as feasible, in establishing personal contacts between producers and consumers in order to assist in marketing the surplus products of home gardens and the produce of truck growers and others which for any practical reason can not profitably be marketed through ordinary commercial channels. Agents are placed in a number of large cities throughout the country to awaken interest in direct marketing among consumers. Agents also work through the postmaster in small towns in interesting producers in furnishing supplies. Attention is given in cooperation with the Post Office Department to the direct marketing of farm products by means of motor trucks.

*Scientific staff*.—C. C. Hawbaker and Frank D. McClure, assistants in marketing by parcel post; H. A. Spilman, John W. Strowbridge, and John L. Dove, assistants in direct marketing; and Walter F. Plummer, assistant in marketing fruits and vegetables.

**Motor Transportation of Farm Products.** J. H. COLLINS, *Investigator in Market Surveys*.

The object of this work is to demonstrate the business possibilities of motor-truck routes in rural districts where present transportation facilities are inadequate; to encourage and stimulate the installation of motor routes for package freight and express where such service is needed and, in general, to promote a more extensive utilization of our highways by producers in order to bring them into closer commercial touch with consuming centers.

*Scientific staff*.—H. S. Yohe, M. L. Henry, W. M. Orr, H. W. Watjen, jr., assistants in market surveys; R. H. Black, assistant in marketing.

**Special Marketing Activities.** CHARLES J. BRAND, *Chief of Bureau*.

This work covers special marketing activities useful in connection with the war emergency, such as demonstrations regarding the cooperative purchasing and marketing of farm products, foreign marketing investigations, demonstrations of the proper methods of grading and standardizing farm products, and investigations and demonstrations regarding the best methods of marketing cotton seed and soy beans. Grain grading exhibits and demonstrations are also conducted in order to acquaint farmers and country shippers with the official grain standards.

*Scientific staff*.—Wm. M. Scott, specialist in fruit grading and standardization; C. T. More, specialist in market grades and standards; Fred Taylor, cotton technologist; C. W. Moomaw, specialist in foreign marketing; and Ralph H. Brown, grain supervisor.

**Farm Storage of Sweet Potatoes.** H. J. RAMSEY, *Pomologist in charge*, and C. W. MANN, *Pomologist*.

The object of this work is to assist in reducing the losses incident to the transportation and storage of the sweet-potato crop, in facilitating wider distribution, and in stabilizing production by demonstrating the effect upon the market value and soundness of the sweet potato of the various methods used in handling, transporting, and storing it.

*Scientific staff*.—M. C. Gay, field agent in marketing; D. B. Carrick, investigator

in marketing fruits and vegetables; H. A. Jones, assistant in fruit and vegetable storage demonstrations; W. R. Thompson and F. L. Harkey, assistants in marketing fruits and vegetables.

**Purchase and Distribution of Nitrate of Soda.** CHARLES J. BRAND, *Chief of Bureau*, assisted by D. S. MURPH, *Specialist in Cotton Marketing and Warehousing*; and GEORGE R. ARGO, *Assistant in Cotton Business Methods*.

Under authority contained in section 27 of the Food-Control Act, which authorized the President to procure and sell nitrate of soda to farmers at cost, and appropriated \$10,000,000 for this purpose, the War Industries Board was designated to make arrangements for the purchase of such nitrate and the Secretary of Agriculture to arrange for its sale and distribution. The Bureau of Markets was designated by the Secretary of Agriculture as the agency for handling the work to be done by the Department of Agriculture.

By virtue of authority contained in the Agricultural Appropriation Bill for the year 1919 moneys received by the United States in connection with the distribution of nitrate of soda, as provided in section 27 of the Food-Control Act, were appropriated and made available as a revolving fund to be used for further carrying out the purposes of said section and extending its operation throughout the period of the existing war.

**Regulation of Stockyards and Live-stock Dealers.** CHARLES J. BRAND, *Chief of Bureau*, assisted by L. D. HALL, *Specialist in Marketing Live Stock and Meats*.

Pursuant to the recommendation of the President's meat commission, a proclamation was issued by the President on June 18, 1918, requiring all stockyards which are operated for compensation or profit and all persons handling or dealing in live or dead stock in or in connection with such stockyards, to secure a license from the Secretary of Agriculture on or before July 25, 1918. The Chief of the Bureau of Markets was designated by the Secretary of Agriculture to administer the supervision of licensees under this proclamation.

*Scientific staff*.—W. N. Waddell, expert in marketing live stock; James Atkinson, specialist in live-stock marketing; Arthur F. Stryker, consulting expert in stockyard supervision; Stephen Bray and William E. Doble, assistants in marketing live stock and meats; Lewis C. Bailey, James Christensen, Harry L. Dallwigg, Garrett E. King, John D. Lewis, Albert L. Price, John M. Seabolt, W. W. Stockton, William G. West, and H. W. Challis, live-stock market supervisors; Ben M. Bell, Thos. O. Coons, Phin F. Stacy, and Thos. W. Chittick, live-stock market assistant supervisors.

#### BOARDS AND COMMITTEES.

##### **Insecticide and Fungicide Board.**

The Insecticide and Fungicide Board, created December 22, 1910, assists the Secretary of Agriculture in the enforcement of the insecticide act of 1910.

*Members*.—J. K. Haywood, chairman; M. B. Waite, A. L. Quaintance, and James A. Emery; executive officer, J. G. Shibley.

##### **Federal Horticultural Board.**

The Federal Horticultural Board, created August 21, 1912, assists the Secretary of Agriculture in the enforcement of the plant quarantine act of August 20, 1912.

*Member*.—C. L. Marlatt, chairman; W. A. Orton, vice chairman; George B. Sudworth, W. D. Hunter, and Karl F. Kellerman; R. C. Althouse, secretary of board.

*Entomological inspectors*.—E. R. Sasser, H. L. Sanford, and Norman Perrine.

*Pathological inspectors*.—R. Kent Beattie, C. H. Kauffman, John T. Rogers, John A. Stevenson, and C. C. Thomas.

*In charge of entry of plants and plant products under restriction*.—Lester E. Palmer

#### PORt INSPECTION SERVICE.

This service enforces the conditions of entry with relation to cotton, nursery stock, and other plants and plant products the entry of which is regulated.

*Boston office*.—R. I. Smith, quarantine inspector in charge; *assistant*, Irving L. Bailey.

*New York office*.—H. B. Shaw, *pathologist in charge*; *assistant*, D. G. Tower.

*Seattle office*.—Alan G. Webb, *quarantine inspector in charge*.

*Calicico office*.—O. A. Pratt, *scientific assistant in charge*.

#### TEXAS-MEXICAN INSPECTION SERVICE.

The inspectors engaged in this service are charged with the enforcement of the rules and regulations prohibiting the movement of cotton and cotton seed from Mexico into

the United States, and governing the entry into the United States of railway cars and other vehicles, freight, express, baggage, or other materials from Mexico at border points, to guard against the entry with such vehicles and materials of the pink bollworm of cotton. These inspectors are distributed as follows:

*El Paso*.—H. H. Willis.

*Del Rio*.—R. B. Haller.

*Eagle Pass*.—J. A. Davis and H. C. Eagerton.

*Laredo*.—O. D. Deputy, Edgar S. Jewell, E. G. Hagadorn, S. L. Foster, O. K. Courtney, and Le Roy Dorland.

*Brownsville*.—H. G. H. Weinert.

#### PINK BOLLWORM ERADICATION.

This work involves the inspection of cotton fields to determine any sporadic outbreaks of the pink bollworm; in cooperation with the State concerned the clean-up of any infested fields found; the establishment of cotton-free areas at points which may have been infested as a further means of extermination and of cotton-free zones on or near the border of any State or States adjacent to Mexico to prevent natural migration and entry of the insect; and the conduct of such other work as may be necessary to prevent the establishment or spread of the pink bollworm in the United States.

*Houston office*.—W. D. Hunter, *in charge*; *plant quarantine inspectors*, C. H. Arndt, Murray Hunter Arnold, Garapet M. Avakian, W. E. Ayers, G. Claude Bond, James S. Brock, H. M. Brundrett, H. M. Cely, Emerson L. Diven, Roy A. Epperson, W. W. Evans, Lester C. Griffith, C. C. Halbedl, John C. Hamlin, Herbert C. Hanson, G. G. Harris, H. S. Hensley, P. A. Holdale, Alpha C. Johnson, H. M. Jones, L. F. Locke, W. R. Martin, H. C. Millender, John D. More, Walter Ohlendorf, Felix S. Puckett, Frank J. Rimoldi, Ralph R. Rosa, G. J. Scholl, Harris P. Smith, Sidney D. Smith, A. A. Stalmach, J. L. Starnes, and Karl H. Townsend.

#### PINK BOLLWORM WORK IN MEXICO.

A field station for the investigation of the life history of the pink bollworm of cotton has been established in the Laguna region at Lerdo, Durango, Mexico. It is also proposed to conduct surveys in Mexico to determine the distribution of the pink bollworm in that country and, in cooperation with the Mexican Government or local Mexican authorities, to conduct clean-up operations in an effort to exterminate this insect.

*Research laboratory*.—August Busck, *entomological assistant in charge*; *assistants*, U. C. Loftin, W. K. Hanson, and K. B. McKinney.

#### COLLABORATORS OF THE BOARD.

Some 70 State officials connected with plant quarantine and control work have been appointed collaborators of the Federal Horticultural Board to assist in the enforcement of the various quarantine and regulatory orders issued under the Plant Quarantine Act.

#### Editorial Committee of the Journal of Agricultural Research.

The Journal of Agricultural Research publishes technical papers giving the results of the various lines of research carried on by the department and by the State agricultural experiment stations. The selection of the papers and the conduct of the Journal are intrusted to this committee.

*Members*.—K. F. Kellerman (chairman), E. W. Allen, and C. L. Marlatt for the Department of Agriculture; J. G. Lipman (New Jersey), W. A. Riley (Minnesota), and H. P. Armstoy (Pennsylvania) for the Association of American Agricultural Colleges and Experiment Stations; I. I. Denison, editorial clerk.



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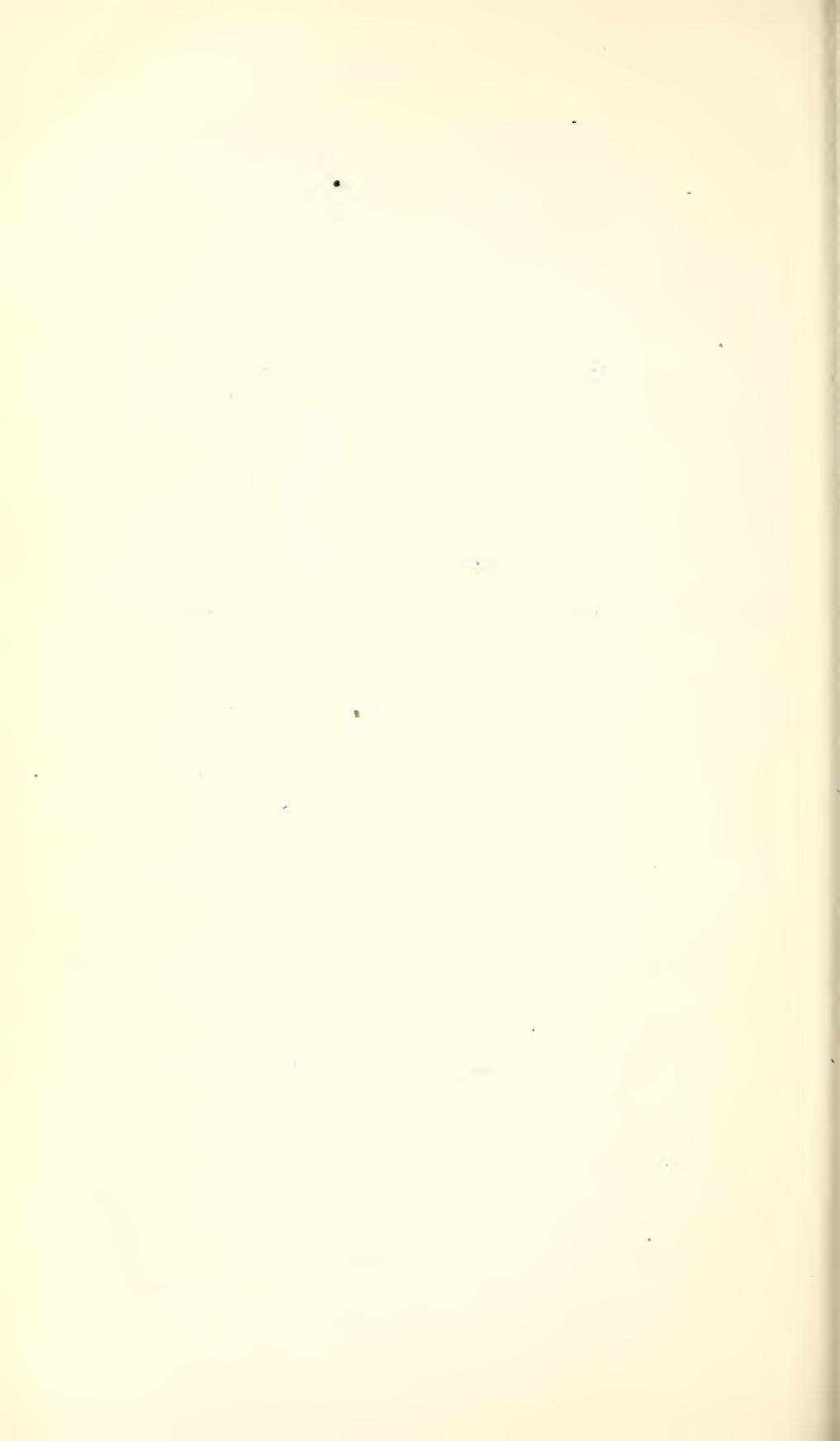
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PART 2.

STATE AGRICULTURAL COLLEGES AND  
EXPERIMENT STATIONS.

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Prepared in the States Relations Service,  
A. C. TRUE, *Director.*

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<sup>1</sup> Died January 28, 1919.

## KEY TO ABBREVIATIONS.

<i>Acct.</i> , Accountant, Accounts.	<i>Hort.</i> , Horticulture, Horticulturist, Horticultural.
<i>Actg.</i> , Acting.	<i>Husb.</i> , Husbandry, Husbandman.
<i>(Actg.)</i> , Acting Professor.	<i>Iyg.</i> , Hygiene.
<i>(Adjunct)</i> , Adjunct Professor.	<i>Indus.</i> , Industry, Industrial, Industries.
<i>Agr.</i> , Agriculture, Agriculturist, Agricultural.	<i>Inorg.</i> , Inorganic.
<i>Agron.</i> , Agronomy, Agronomist.	<i>Insp.</i> , Inspection, Inspector.
<i>Agt.</i> , Agent.	<i>Instr.</i> , Instruction, Instructor.
<i>An.</i> , Animal.	<i>Insts.</i> , Institutes.
<i>Anal.</i> , Analytical, Analysis.	<i>Invest.</i> , Investigations, Investigational.
<i>Anat.</i> , Anatomy.	<i>Irrig.</i> , Irrigation, Irrigationist.
<i>Arch.</i> , Architecture.	<i>(Junior)</i> , Junior Professor.
<i>Assoc.</i> , Associate.	<i>Lab.</i> , Laboratory.
<i>(Assoc.)</i> , Associate Professor.	<i>Landsc.</i> , Landscape.
<i>Asst.</i> , Assistant.	<i>Lect.</i> , Lecturer.
<i>(Asst.)</i> , Assistant Professor.	<i>Libr.</i> , Library, Librarian.
<i>Bact.</i> , Bacteriology, Bacteriologist.	<i>Mach.</i> , Machine, Machinery.
<i>Biol.</i> , Biology, Biologist, Biological.	<i>Mech.</i> , Mechanics, Mechanical.
<i>Bot.</i> , Botany, Botanist, Botanical.	<i>Meteor.</i> , Meteorology, Meteorologist.
<i>Brdg.</i> , Breeding.	<i>Mfrs.</i> , Manufactures.
<i>Chair.</i> , Chairman.	<i>Mgr.</i> , Manager.
<i>Chem.</i> , Chemistry, Chemist, Chemical.	<i>Mgt.</i> , Management.
<i>Climat.</i> , Climatology, Climatologist.	<i>Mycol.</i> , Mycology, Mycologist.
<i>Coll.</i> , College.	<i>Nat.</i> , Natural.
<i>Comp.</i> , Comparative.	<i>Nutr.</i> , Nutrition.
<i>Comr.</i> , Commissioner.	<i>Oler.</i> , Olericulture, Olericulturist.
<i>Consult.</i> , Consulting.	<i>Org.</i> , Organic.
<i>Coop.</i> , Cooperation, Cooperative, Cooperator.	<i>Ornith.</i> , Ornithology, Ornithologist.
<i>Corresp.</i> , Correspondence, Correspondent.	<i>Parasitol.</i> , Parasitology, Parasitologist.
<i>Dem.</i> , Demonstration, Demonstrator.	<i>Path.</i> , Pathology, Pathologist.
<i>Dept.</i> , Department.	<i>Pedag.</i> , Pedagogy, Pedagogics.
<i>Dir.</i> , Director.	<i>Pharm.</i> , Pharmacy, Pharmacist, Pharmaceutical.
<i>Dist.</i> , District.	<i>Photog.</i> , Photography, Photographer.
<i>Distrib.</i> , Distribution.	<i>Phys.</i> , Physics, Physicist, Physical.
<i>Div.</i> , Division.	<i>Physiol.</i> , Physiology, Physiologist, Physiological.
<i>Dom.</i> , Domestic.	<i>Pomol.</i> , Pomology, Pomologist, Pomological.
<i>Econ.</i> , Economy, Economic, Economics.	<i>Pract.</i> , Practice, Practical.
<i>Ed.</i> , Education.	<i>Prep.</i> , Preparatory.
<i>Elc.</i> , Elementary.	<i>Pres.</i> , President.
<i>Engin.</i> , Engineer, Engineering.	<i>Prin.</i> , Principal.
<i>Ent.</i> , Entomology, Entomologist, Entomological.	<i>Prod.</i> , Production, Products.
<i>Erad.</i> , Eradication.	<i>Professor</i> , shown by giving subject only, as
<i>Expt.</i> , Experiment, Experimentalist, Experimental.	<i>Agron.</i> , i. e., professor of agronomy.
<i>Ext.</i> , Extension.	<i>Sci.</i> , Science, Scientific.
<i>(Ext.)</i> , Extension Professor.	<i>Sec.</i> , Secretary.
<i>(Ext. Asst.)</i> , Extension Assistant Professor.	<i>Secon.</i> , Secondary.
<i>(Ext. Assoc.)</i> , Extension Associate Professor.	<i>Social.</i> , Sociology.
<i>Feed.</i> , Feeding.	<i>Sta.</i> , Station.
<i>Fert.</i> , Fertility, Fertilizer.	<i>Substa.</i> , Substation.
<i>Flor.</i> , Floriculture, Floriculturist, Floricultural.	<i>Supt.</i> , Superintendent.
<i>For.</i> , Forestry.	<i>Surg.</i> , Surgery.
<i>Gard.</i> , Gardening.	<i>Tech.</i> , Technology, Technologist, Technical.
<i>Gen.</i> , General.	<i>Treas.</i> , Treasurer.
<i>Geol.</i> , Geology, Geologist, Geological.	<i>Trop.</i> , Tropical.
<i>Grad.</i> , Graduate.	<i>Univ.</i> , University.
<i>Histol.</i> , Histology.	<i>Veg.</i> , Vegetable, Vegetation.
	<i>Vet.</i> , Veterinary, Veterinarian.
	<i>Vit.</i> , Viticulture, Viticulturist, Viticultural.
	<i>Voc.</i> , Vocational.
	<i>Zool.</i> , Zoology, Zoologist.

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\*†Mary E. Martin, Asst. Libr.

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\*Gladys Tappen, Asst. State Home Dem. Agt. and Poultry Specialist.

NOTE.—These lists were compiled by Mary A. Agnew and Althea E. Thacker, of the States Relations Service. They include only names of persons directly engaged in teaching, investigation, or demonstration in agriculture and home economics.

The names are arranged alphabetically for each institution. This arrangement, with the name index at the end of the list, it is thought, will facilitate the finding of names, especially in the longer lists. An asterisk (\*) indicates a college officer, a dagger (†) a station officer, and a double dagger (‡) an extension worker. When the title of the position in the station differs from that in the college the latter is given first, except in the case of the director of the station. A key to the abbreviations used is given on page 4.

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 \*Birdie O. Bird, *Home Decoration.*  
 \*R. E. Brown, A. M., *Chem., Phys., Agr.*  
 \*Mrs. Katherine Bullock, *Housekeeping.*  
 \*W. T. Gravitt, *Farm Mgr., Trucking and Field Crops.*  
 \*Mrs. J. T. Gray, *Sewing.*

\*Mrs. Mollie A. Grice, *Housekeeping.*  
 \*H. C. Hopkins, M. S., *Agr.*  
 \*Mrs. W. S. Little, *Dressmaking.*  
 \*Mrs. Odessa M. Parker, *Dom. Sci.*  
 \*G. W. Patterson, *Farm Dem. Ext.*  
 \*Mrs. Cornelia J. Pickett, *Laundering.*  
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 \*†F. H. Cardozo, *Dir. of Agr. Dept.*  
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 ‡C. J. Calloway, *Dir. of Ext. Dept.*

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 \*†J. H. Bias, D. V. M., *Vet.*  
 \*Mary E. Brown, *Sewing and Cooking.*  
 †N. Juanita Coleman, *Home Econ. Ext.*  
 \*†T. N. Cowen, *Farm Supt.*  
 \*Mary E. Davis, *Housekeeping.*  
 \*Minnie E. Davis, *Housekeeping.*  
 †E. C. Dobbs, *U. S. Farm Dem.*  
 \*Ophelia M. Donaldson, *Laundering.*  
 \*J. H. Fair, *Agr. Bookkeeping.*  
 †G. W. Goodwin, *U. S. Farm Dem..*  
 \*Della D. Harris, *Ladies' Tailoring.*  
 \*†W. W. Hayes, *Farm Crops.*  
 \*Henry Howard, *Gardening.*  
 \*†C. A. Lancaster, *Poultry Raising.*  
 \*Caroline C. Owens, *Home Crafts.*

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 †N. D. Ricks, *U. S. Farm Dem.*  
 \*Mary B. Scott, *Housekeeping.*  
 \*†F. M. Staley, B. S., *Agr. Chem., Dairy.*  
 \*Ernestine Suarez, *Libr.*  
 \*Lorena C. Taylor, *Dom. Sci.*  
 \*Susie M. Waggener, *Dom. Sci.*  
 \*Mrs. B. T. Washington, *Dir. Women's Indus.*  
 \*†L. J. Watkins, *Fruit and care of Forest.*  
 \*†J. E. Whitfield, *Dairy Husb. and Cream-cry.*  
 \*Pearl Williamson, *Laundering.*  
 \*D. A. Williston, B. S., *Dir. Dept. of Landsc. Gard.*  
 \*†Matthew Woods, *Horse Husb.*

ALASKA.

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 United States Department of Agriculture.

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 †F. E. Rader, B. S., *Asst. in charge, Matanuska.*  
 †M. D. Snodgrass, B. S., *Asst. in charge, Fairbanks.*  
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- \*‡W. S. Cunningham, B. S., *(Assoc.) An. Husb.; Asst. An. Husb.*
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- ‡N. L. Harris, *Poultry Specialist.*
- ‡Agnes A. Hunt, B. S., *Asst. in Club Work.*
- \*F. C. Kelton, M. S., *Asst. Irrig. Engin.*
- \*‡A. F. Kinnison, B. S., *(Asst.) Hort.; Asst. Hort.*
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- ‡W. E. Schneider, B. S., *Boys' and Girls' Swine Clubs.*
- ‡G. E. P. Smith, C. E., *Irrig. Engin.*
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- \*‡G. E. Thompson, B. S., *Agron.*
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- \*‡A. E. Vinson, Ph. D., *Agr. Chem.; Biochem.*
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 \*†W. V. Cruess, B. S., (*Asst.*) *Zymology*.  
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 †J. A. Denny, *Foreman in Cereal Work*, (*Fresno*).  
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 \*†G. P. Gray, M. S., (*Asst.*) *Ent., Chem. Insecticides Lab.*  
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 \*†J. C. Martin, B. S., *Asst. in Agr. Chem.*  
 \*†D. T. Mason,<sup>1</sup> M. S., M. F., *For.*  
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 \*†Elwood Mead, D. E., *Rural Institutions*.  
 \*†Woodbridge Metcalf, M. S. F., (*Asst.*) *For.*  
 \*†Blythe F. Monroe, B. S., *Asst. in Soil Tech.*  
 \*†J. G. Moodley, B. S., (*Asst.*) *Agr., Asst. to Dir.*  
 \*†Walter Mulford, F. E., *For.*  
 \*†J. W. Nelson, B. S., (*Asst.*) *Soil Tech.*  
 \*†J. H. Norton, M. S., *Instr. Chem.* (*Davis*).  
 \*†P. T. Peterson, D. V. M., *Instr. Vet. Sci. in charge of Serum Mfg.*  
 \*†G. L. Philp, M. S., *Instr. Pomol.* (*Davis*).  
 \*W. T. Pope, M. S., *Instr. Bot.* (*Davis*).  
 \*†J. A. Prizer, B. S., *Supt. of Cultivations* (*Riverside*).  
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\*Helen B. Barker, *Household Mgt.*

†Helen Bolan, *Asst. State Club Leader.*

\*B. A. Brown, *Supt. of Plats.*

‡A. J. Brundage, *State Club Leader.*

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†L. M. Chapman, B. S., *Asst. Dairy Husb.*

‡R. E. Dodge, M. A., *Asst. State Leader County Agts.*

‡Henry Dorsey, M. S., *Field Ayt., Ext. Agron.*

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‡Maud E. Hayes, A. M., *State Leader Home Dem. Agts.*

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\*J. L. Hughes, A. M., *Instr. Chem.*

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‡Elmo Ragsdale, B. S., <i>Field Agt. in Hort.</i>	*H. C. White, Ph. D., Sc. D., <i>Chem.</i>
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 \*Howard Jackson, *Instr. Laundering.*  
 \*R. H. Thomas, *Farm Supt.*

\*W. D. Thomas, A. M., M. D., *Instr. Nat. Sci.*  
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#### GUAM.

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†Glen Briggs, B. S., *Agron. and Hort.*

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†Joaquin Guerrero, *Asst. in Hort.*

‡Peter Nelson, *Assistant.*

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## HAWAII.

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- \*Minnie E. Chipman, *Ceramics and Design*, (*Dom. Arts*).
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- \*Anna von B. Dahl, *Instr. Textiles*.
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 \*G. R. Boomer, *Asst. Farm Mgt. Dem.*  
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 \*Ruth Curtiss, B. S., *(Asst.) Home Econ.*  
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 \*J. A. Holden, B. S., *Supt. Scottsbluff Substa., Mitchell.*  
 \*R. E. Holland, B. S., *County Agt. Leader.*

<sup>1</sup> On leave.

<sup>2</sup> In charge of substations.

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- \*E. H. Hoppert, B. S., (*Assoc.*) *Ext. Hort.*
- \*†R. F. Howard, M. A. *Hort.*
- \*E. L. Jenkins,<sup>1</sup> M. S., (*Asst.*) *An. Husb.*
- \*†F. D. Keim, B. S., *Agron.*
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- ‡C. E. Mickel,<sup>1</sup> B. S., *Field Ent., Specialist in Ent.*
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- \*Marjorie Quaw, B. S., *Instr. Home Econ.*
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- †J. W. Snell, *Insp. Feed Control Service.*
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- †Waldo Walker, *Asst. Chem.*
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- ‡C. I. Withers, *Sci. Asst., Substa. No. 4, Beaumont.*
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- \*C. A. Wood, B. S., (Assoc.) *Agron.*
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- \*W. M. Cain, *Agr., Supt. Farm and Cannery.*
- \*H. S. Estelle, *Asst. in Agr.*

- \*A. D. Ewell, *Laundry Foreman.*
- \*Mrs. R. L. Ewell, *Asst. in Laundry.*
- \*Mrs. Mary B. Jones, *Sewing, Millinery.*
- \*Miss C. L. Lewis, *Cooking, Dom. Econ.*
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- ‡B. R. Eldridge, B. S., *Dairy Specialist.*
- ‡R. J. Evans, Ph. D., *Asst. Dir. Ext. Div. and State Leader of County Agts.*
- †S. P. Ewing, *Asst. Met.*
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 ‡Hortense White, B. S., *Asst. in Home Econ.*  
 ‡Alma L. Wilson, B. S., *Specialist in Plant Path.*  
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## VERMONT.

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<sup>1</sup> On leave.

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## Hampton Normal and Agricultural Institute, Hampton.

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\*†C. K. Graham, Dir. Agr. Dept. and Agr. Ext. Work.

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\*Clara A. Blakeslee, Teacher Dom. Art.

\*P. E. Bowman, in charge Students' Kitchen.

\*E. L. Davis, in charge Horse Barn.

‡G. J. Davis, Rural Community Work.

\*‡G. C. Faville, Vet.

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\*Annie M. Goodrich, Teacher Elec. Agr.

\*Henrietta L. Graves, Physiol., and Hyg.

\*Daisy L. Guillette, Instr. Laundry Work.

\*Lenora E. Herron, Libr.

\*Ethel Hill, Teacher Dom. Arts.

\*T. J. Howard, in charge Meat Market.

\*W. R. Jackson, Asst. in Whipple Farm Dairy.

\*Mary R. Kennedy, Teacher Home Econ.

\*Peter Kinghorne, Florist, Landsc. Gard.

\*Sara Lane, Bact. in Dom. Sci. Dept.

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\*Caroline E. Lent, in charge of Greenhouses.

\*Josephine Leverette, in charge of Laundry.

\*Ellen Maynoid, Dom. Sci., Holly Tree Inn.

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\*Caroline D. Pratt, Dir. Dom. Arts Dept.

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\*D. Scott, in charge Dairy Indus.

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\*Mary L. Stephens, Instr. Laundry Work.

\*Maude V. Stickle, Teacher Dom. Sci.

\*E. Jeanette Taylor, Teacher Dom. Sci.

\*E. S. Thornton, Asst. at Shellbanks Farm.

\*J. A. Vohringer, Mgr. Shellbanks Farm.

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## VIRGIN ISLANDS.

## Agricultural Experiment Station, St. Croix.

Under the supervision of the Office of Experiment Stations, States Relations Service, United States Department of Agriculture.

†Longfield Smith, Ph. D., Agronomist in charge.

## WASHINGTON.

## State College of Washington and the Agricultural Experiment Station, Pullman.

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- \*†‡E. G. Schafer, M. S., Farm Crops; Agron.
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- ‡Edna Walker, B. S., Asst. State Leader of Home Econ.
- \*†‡O. L. Waller, Ph. M., Irrig. Engin., Vice Pres.
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- \*†E. G. Woodward, A. M., Dairy Husb.
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#### WEST VIRGINIA.

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- ‡C. H. Hartley, B. S., Asst. to Dir. of Agr. Ext. Dept.
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- †B. H. Hite, M. S., Chem.
- ‡R. R. Hogue, Cheese Specialist (Coop. U. S. D. A.).
- ‡W. H. Kendrick, B. S., in charge Boys' Club Work.
- †J. H. B. Krak, B. S., Asst. Chem.
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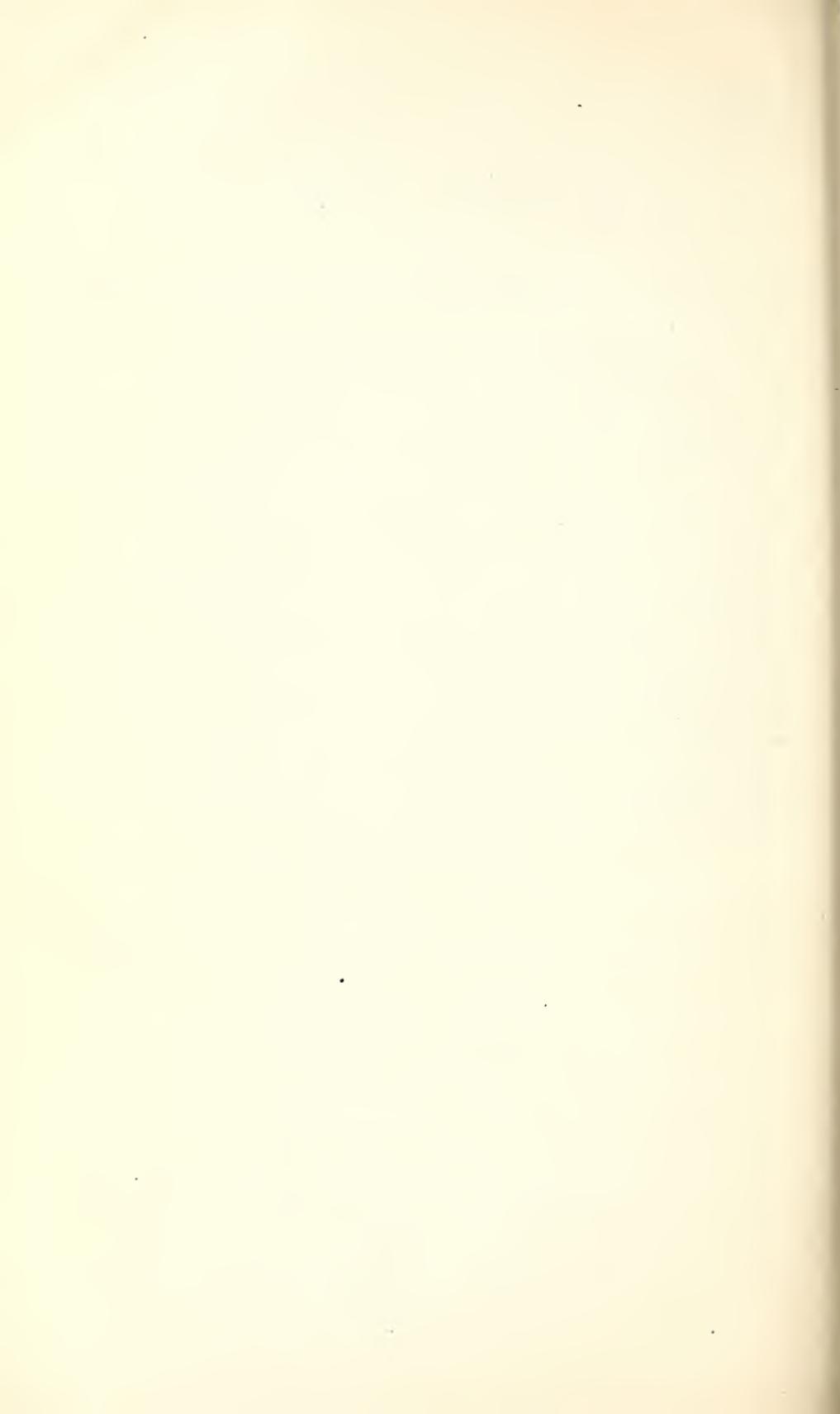
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<sup>1</sup> On leave.



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Ikeler, K. C., 21.	Johnson, A. G. (Wis.), 64.	Judkins, H. F., 21.
Iler, W. D., 25.	Johnson, C. F., 24.	Juve, O. A., 64.
Ince, J. W., 46.	Johnson, D. R., 49.	Kadderly, W. L., 50.
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Inman, C. C., 27.	Johnson, H. W., 21.	Kastle, E. T., 15.
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James, E. J., 16.	Jones, E. I., 60.	Kelly, E. O. G., 24.
James, J. A., 64.	Jones, E. R., 64.	Kelly, H., 50.
James, R. W., 63.	Jones, G. R., 13.	Kelly, J. J., 57.
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Jamison, O. A., 29.	Jones, H. M., 24.	Kelly, M. C., 21.
Jamison, W. G., 10.	Jones, J. M. (Tex.), 57.	Kelton, F. C., 7.
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